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IRON DISCOVERIES IN THE STATE OF NEW YORK.

The important results of the investigations by Mr. D. H. Newland, Assistant State Geologist, and Mr. C. A. Hartnagel, Assistant in Economic Geology, of the iron ores of central New York, have been published as *Bulletin* 123 of the New York State Museum. The report, entitled "Iron Ores of the Clinton Formation in New York State," is of special interest, because it reveals the existence of large bodies of ore that had not been discovered until the present time. The investigations were carried on by continuous drilling during the autumn, winter, and spring of 1907-8 in a field where but slight effort has hitherto been made to estimate the volume of iron ore available for production. In his letter transmitting the paper for publication Dr. John M. Clarke, State Geologist, says that "the report conclusively indicates that in the region of Central New York there exists a commercial asset of great magnitude and vast importance to the people of this State." The investigations relate to a territory about 100 miles in length extending through the central part of the State from Oneida and Otsego counties on the east to Wayne County on the west. The Legislature made a special appropriation of $5,000 for the work in the annual supply bill of 1907.

In a letter introducing the report, Commissioner A. S. Draper says:

> I find much satisfaction in the assurance of the geologist that a conservative estimate, based upon this investigation, of the quantity of iron ore deposited in this region, places the amount at 600,000,000 tons. If this estimate is warranted, New York might yet easily become the leading iron State in the Union.

The Clinton formation comprises not only shales, limestones and sandstones, but also interbedded layers of hematite iron ore. The

hematites have been worked commercially, though with some interruptions, since the early part of the nineteenth century. A mining lease was granted in Oneida County in 1797 and a small quantity of ore was shipped from Wayne County during the war of 1812. Regular mining operations were not carried in until about 1825. A few years later, charcoal forges and furnaces were erected in Wayne, Madison and Oneida Counties, and for the past few years the production of Clinton ores has averaged about 75,000 tons. In 1907 it was 109,025 tons. The aggregate from the beginning may be placed at from 4,000,000 to 5,000,000 tons, which is approximately the yield obtainable, with the average workable seam, from a square mile of area. All the mining has been confined to the surface portions of the

OUTCROP OF CLINTON FORMATION IN NEW YORK.

beds and the mining interests have known nothing of the ores beneath the superficial deposits or of the greater part of the belt that is covered deeply under glacial débris.

While the present investigations were confined to the region in central New York between Otsego and Wayne Counties, the Clinton strata have long been known to extend from Otsego County to the Niagara River and thence for some distance into the Province of Ontario. The length of the belt within the limits of New York is about 225 miles and the width of the strata varies up to five miles. Utica is a little north of the outcrop, Rochester is near its southern edge, and Lockport stands on it. Rochester is the only place east of the Niagara gorge where the strata are exposed from base to top. The formation falls within the middle division of the Upper Siluric or Ontaric system.

It was found that the conditions throughout the belt facilitate exploratory operations with the drill and permit reliable deductions

from the data obtained. The ore seams maintain a fairly constant horizon in the series, so that there need be little error in estimating the depth at which they will be encountered in most places.

The exploratory work was performed entirely with a diamond core drill, by which means a core, one inch in diameter, representing a section of the rocks and ore penetrated, was secured. Eight holes were put down at intervals of about 10 miles between Verona Station, Oneida County, and Wallington, Wayne County. The details of the rock sections thus obtained are presented in tables. Only one test hole, that at Lakeport, gave indications unfavourable to the presence of any considerable body of ore. The ores belong to the red, earthy variety of hematite and the iron content is from 35 to 45 per cent.

In the calculation that the quantity of ore available in the region examined is approximately 600,000,000 tons, all ore was excluded that is below 18 inches thick or more than 500 feet from the surface. The larger part of the ore available for underground mining is in the western areas of Cayuga and Wayne Counties. The report says that the volume of ore is so large that "it must be considered as one of the important reserves in the present fields of iron mining. A great proportion, of course, will not be subject to profitable extraction for many years to come. But if limitations be put upon the estimate so as to bring it into relation more or less close with the existing status of the mining industry, the total will still be large." The report covers 76 pp. with three maps, a considerable number of photographs and a bibliography.

A GEOGRAPHIC INTERPRETATION OF NEW YORK CITY, PART III—(Conclusion).*

BY

F. V. EMERSON.

The Railroads and New York.—The period of about twenty-five years from the opening of the Erie Canal was one of great activity in canal building. Hundreds of miles were built, but most of the canals were to be abandoned before they could be brought to a paying basis. In most cases the competition of the railroad

* Part I printed in Bulletin in October and Part II in December, 1908.

was the cause of the failure of the canal. The success of the English canals, which had been a strong incentive to canal construction in America, had been largely achieved before the effective building and operation of the railroads. By 1880, out of a total of 4,468.6 miles of canal built in the United States—most of them built prior to 1850—1,953.56 miles or 43.7 per cent. had been abandoned.*

It was fortunate for New York City that its supremacy did not rest on the great canal alone. The first railroads were not thought of as competitors of the canal for freight. They were built for passenger traffic.†

Boston, Philadelphia and Baltimore, the principal rivals of New York, saw in the railroad an opportunity to overcome that city's advantage of interior communications. The railroad could climb grades and cross divides that were impossible to the canal and often their initial cost was less. We have seen that Pennsylvania completed in 1834 a line of railroad and canal from Philadelphia to Pittsburg. In 1857 the State sold the system to the Pennsylvania Railroad for $7,000,000. This railroad had paralleled the canal and absorbed its traffic. The Appalachian Ridges and the Eastern Alleghany Plateau through which the easterly state system ran was not densely populated nor productive. The resources of coal and iron contained in this region were not early developed.

The merchants of Baltimore looked with suspicion upon the Chesapeake and Ohio Canal project, since its terminus was not at Baltimore, and in 1828 the Baltimore and Ohio Railroad was begun. Like the Pennsylvania system, it must cross the Appalachian Ridge belt and the Eastern Alleghany Plateau. The interest of the city and State in the project is shown in the fact that Baltimore subscribed $3,500,000 and the State of Maryland $4,000,000 to the capital stock. The State, moreover, according to the charter,

* See tables, census of 1880, Vol. IV, Canals.

† This is shown by the receipts of two early roads. Receipts from the system that afterwards became the New York Central:

	PASSENGERS.	FREIGHT.
1843.....	1,008,026	103,093
1858.....	2,532,647	3,995,766
1902.....	19,183,000	35,939,111
Receipts from the Erie Railroad:		
1851.....	1,163,536	1,196,337
1858.....	1,182,258	3 969,358

From Report of N.Y. Cham. of Com., p. 58, and Statistics of Railways in the U. S., 1902, pp. 358–9.

released the corporation from all taxation in perpetuity.* The road tapped the coal regions of the State and gave cheap and effective transportation for Maryland's flour and tobacco, but by 1852, when it reached Wheeling, it could not to any extent divert the grain trade that went to New York.

The railroad from Boston to Albany was completed in 1842. It could not effectively compete with the navigable Hudson in offering a route from the eastern terminus of the Erie Canal to the seaboard.

In contrast with these energetic measures, New York did little to secure a through line of railroad to her hinterland. The early and successful growth of such a connection was largely in response to geographical advantages. The fertile lands along the Erie Canal located a dense population, while the cheap raw materials, excellent transportation facilities and good Western market, were responsible for the growth of manufacturing centres, in spite of the lack of convenient coal supplies. The railroads of the canal belt therefore originated to supply local demands, and they show a progressive growth from east to west. The easy grades and productive territory are shown in the cheap construction and good returns of the roads through the Mohawk Valley and Lake Plains.†

In contrast with the railroad development from Albany to Buffalo, the road up the narrow and relatively infertile Hudson Valley grew slowly and did not reach Albany until 1851 (Fig. 32). Philadelphia and Baltimore had in the meantime become centres for radiating lines by which their local hinterlands were reached (Fig. 33).

The value and population of the canal belt are shown by a comparison of the counties lying in or near this valley. The grouping of counties given below follows that of the New York

* "Hepburn Report," Vol. V, p. 23

†	COMPLETED LENGTH IN MILES.		TOTAL COST.	AVERAGE COST PER MILE.	NET PER CENT.
Albany & Schenectady.....	1831....	16.91	$1,606,196	$94,985	6.2
Utica & Schenectady.....	1836....	78.	3,222,946	41,384	16.4
Syracuse & Utica.....	1839....	54.8	1,968,036	37,273	13.1
Auburn & Syracuse.....	1838....	26.	1,125,886	43.303	9.1
Auburn & Rochester.....	1841....	78.	2,644,520	33,904	10.
Rochester & Tonawanda.....	1838....	43.5	974,865	22,410	18.2
Attica & Buffalo.....	1838....	31.5	821,313	26,073	10.3
Buffalo & Niagara Falls....	1838....	22.	250,396	11,381	14.2
		350.71			

† "Transportation Systems of the United States," J. L. Ringwalt, 1888, p. 127.

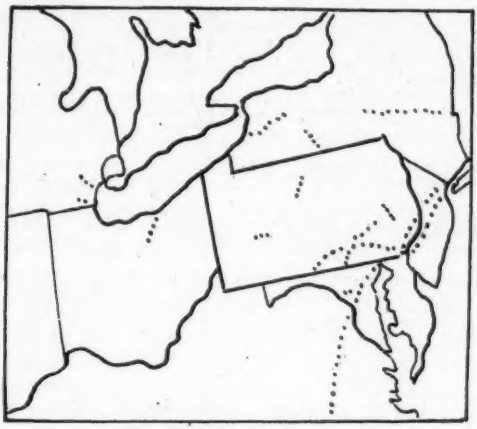

FIG. 32.—Railroads built by 1840.
Coman, "Industrial History of the United States," p. 235.

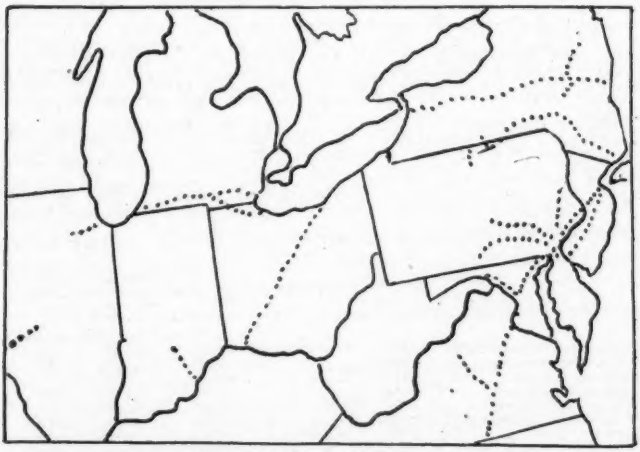

FIG. 33.—Railroads built by 1850.
Coman, "Industrial History of the United States," p. 238.

Committee on Canals, 1899. The so-called canal counties are as follows:

Albany,	Genesee,	Monroe,	Ontario,	Schenectady,
Cayuga,	Herkimer,	Niagara,	Orleans,	Seneca,
Erie,	Livingston,	Onondaga,	Oswego,	Wayne,
Fulton,	Montgomery,	Oneida,	Saratoga,	Wyoming.

The non-canal counties are:

Allegany,	Chautauqua,	Cortland,	Schoharie,	Tioga,
Broome,	Chenango,	Delaware,	Schuyler,	Tompkins,
Cattaraugus,	Chemung,	Otsego,	Steuben,	Yates.

The figures showing a comparison of the two sets of counties are as follows, according to the census reports:

	VALUE OF FARMS WITH IMPROVEMENTS AND IMPLEMENTS.	POPULATION.	NUMBER OF ACRES IMPROVED.	NUMBER OF ACRES UNIMPROVED.
Canal Counties:				
1850.....	$231,967,183	932,585	4,606,579	1,935,413
1880.....	452,557,446	1,404,795	6,261,385	1,518,980
1900.....	368,773,030	1,838,602	5,549,580	1,582,010
Non-Canal Counties:				
1850.....	119,148,862	539,711	3,238,974	2,370,821
1880.....	247,056,192	634,883	5,099,918	1,881,560
1900.....	222,833,910	685,750	4,834,012	1,878,622

The canal counties in 1900 contained nearly three times the population of the non-canal counties, about one-third more value in farms, and in the former region the proportion of improved to unimproved land is three and one-half, while in the latter region the proportion is two and two-thirds.

The completion of the New York Central and Hudson River roads and of the Erie at the time of active development of railroads in the Upper Mississippi Valley, gave New York a somewhat brief continuation of the practical monopoly of the export and import trade of that region so far as the trade tended eastward, which that city had enjoyed from the Erie Canal. And when the Pennsylvania and the Baltimore and Ohio systems finally completed connections with the Upper Mississippi Valley in the decade between 1850 and 1860, they were compelled by the preëminence of New York, to fix rates for, and compete for, transportation to that port.

In 1839 was begun the part of a series of railroads that in 1853 became the railroad connection between Chicago and Buffalo. Partly by State aid and partly by individual corporations the road was built as separate units, and was finally united in the Lake Shore and Michigan Southern. The route, following the narrow

plain at the foot of the Alleghany escarpment, used many of the beach ridges in Ohio and crossed the prairie plains of Indiana and Illinois to Chicago. It intersected the north-south roads that had previously been built. In four years, 1856–59, the road doubled its traffic, and in the twenty-four years, from 1856 to 1880, its traffic increased thirty-two fold in spite of decreasing rates.*

New York was also the terminus of the Erie, the second line of railroad to cross the Alleghany Plateau, but the building of the Erie Road was in defiance of geographic conditions rather than in conformity thereto. The Erie Railroad was chartered in 1832, and a company organized in 1833. The promoters, possibly deceived by the ease of building and good returns of the roads in the Mohawk Valley, at first estimated the cost at only $3,000,000, but it was not opened to Dunkirk, on Lake Erie, until twenty years later. The route led across the Appalachian ridges, and was transverse to the general north-south courses of the valleys in the Alleghany Plateau (Fig. 34). Moreover, its tributary territory was largely the dissected Alleghany Plateau, without people or products to make the road profitable. Like most of the other early trans-Appalachian roads south of the Mohawk, the Erie was in part built with State aid.

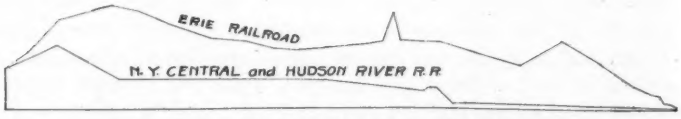

FIG. 34.—Profiles of the Erie and the New York Central Railroads.
"Annual Report of the State Engineer and Surveyor of New York, 1905."

In all comparisons in which physiographic features are a factor, the preëminence of the Mohawk-Lake Plains route is evident. Taking the early trunk lines, their grades give a fair indication of ease of construction, as the following table indicates:

	SUM OF ASCENTS.	TOTAL LENGTH.	LEVEL TRACK.
	Feet.	Miles.	Miles.
New York Central, New York to Buffalo	1,695.51	440.32	211.52
Erie Railroad, New York to Dunkirk	4,233.70	460.03	109.47
Pennsylvania, Harrisburg to Pittsburg	2,959.23	247.51	42.77 †

* "Poor's Manual," 1881, p. 517.
† "Tenth Census," Vol. IV, Table X.

The cost per mile of various railroads brings out the advantage of the Mohawk-Lake Plains route, as will appear from the following comparisons: New York, Buffalo to Albany, about $24,000; Erie, New York to Dunkirk, $60,000; Pennsylvania, Harrisburg to Pittsburg, $50,000; Baltimore and Ohio, Baltimore to Wheeling, $47,000.

In the thirties New York was connected with Philadelphia both by canal and railroad, the route of both being in large part the Cretaceous lowland.

While the railroads in the Mohawk Valley and Lake Plain were developing, the same geographic factors in the Ohio region that invited the building of canals were making for the construction of railroads. By 1840 a few short lines reached from Lake ports into the interior (Fig. 32). But soon the easy grades and dense population of Ohio hastened the building of railroads. The railroads followed the north-south direction of the rivers and canals. In 1848 the Mad River Railroad connected Sandusky on Lake Erie and Dayton, where there was also canal connection with Toledo and Cincinnati. In 1846 the Little Miami connected Springfield and Cincinnati, and in 1851 Cleveland and Cincinnati were connected. In 1854 the Chicago and Rock Island Railroad reached the Mississippi River. This road diverted to the Lake traffic much of the trade that formerly went down the Mississippi.*

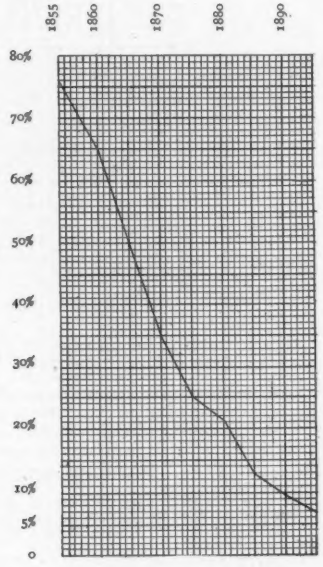

FIG. 35.—Percentage of total tonnage in New York carried by canals. "New York Report on Canals," p. 181.

In the decade from 1840 to 1850 the Ohio canals felt the rapidly growing competition of the railroads, and their traffic fell off in a marked degree. The Erie Canal in the next decade felt the same competition. In 1864 the railroad tonnage in New York for the first time exceeded the canal tonnage. After 1865 the percentage of tonnage carried by the Erie Canal decreased rapidly (Fig. 35).

* "Poor's Manual," 1881, pp. xxiii-iv.

The reason for this decline in canal traffic in all parts of the United States lay in the growing efficiency of the railroads as compared with that of the canals. Canal movement is slow, and because of their location in northern latitudes, the principal canals of the United States are frozen for several months each year when the movement of agricultural products is most active.*

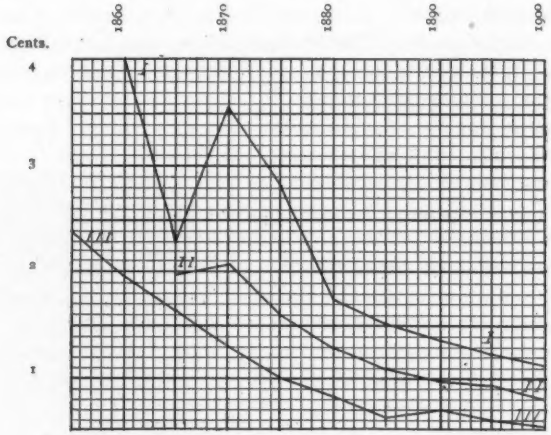

FIG. 36.—Average freight rates per ton-mile for five-year periods on three groups of railroads: I. The Fitchburg, Boston & Maine; New York, New Haven & Hartford, and the Boston & Albany. II. The The Illinois Central, Chicago & Alton, and the Rock Island. III. The Erie, New York Central & Hudson River, Lake Shore & Michigan Southern, and the Pennsylvania.
From Tables in "Changes in the Rates of Charge for Railroad and Other Transportation Services," by H. T. Newcomb, 1901.

The railroads have been increasing the size of their cars and the tonnage of their loads. Up to 1850 the maximum train load on the New York Central was 200 tons or about three or four boat loads at that time. In 1880 the freight train loads averaged about 1,000 tons. At that time the maximum barge capacity was about 240 tons. Since then train loads of 2,000 tons are not uncommon.

* The average dates of the opening and closing of the Erie Canal are given as follows:

	AVERAGE CLOSING DATE.	AVERAGE OPENING DATE.
Albany	Nov. 15	Mar. 30
Buffalo	Dec. 12	Apr. 9
Erie Canal	Dec. 5	Apr. 27

Report of the U. S. Waterway Commission.

Moreover, railroads are adaptable. They can be extended to tap almost any region, and when freight is in the car the tendency is for it not to leave the car in which it is loaded until the destination is reached.

THE GREAT LAKES.—We have seen that the Lake route and the Erie Canal turned the export trade of much of the northern Mississippi Valley to New York. The all-water route to the seaboard had another far-reaching economic effect when the railroad period came in; an effect, on the whole, still favouring New York, but not so partially as before the advent of the railroads.

The Great Lakes are navigable for vessels of considerable draught from Buffalo to Duluth. This waterway, probably the best inland water route in the world, has an exceedingly important economico-geographic influence in its effect on freight rates, a factor that often makes or unmakes commercial centers. The advantage of a free water route is that competition is open and the tendency is towards the maintenance of low freight rates. The competition, both active and potential, of the Lake route with the railroads which parallel it has made long-distance freight rates in that region the lowest in the world.* The effectiveness of water competition is brought out in a study of three groups of roads that may be taken as examples (Fig. 36). One group has its direction approximately parallel to the Lakes, another is roughly perpendicular to the trend of the Lakes, and the third is in New England, where water competition is not important and hauls are

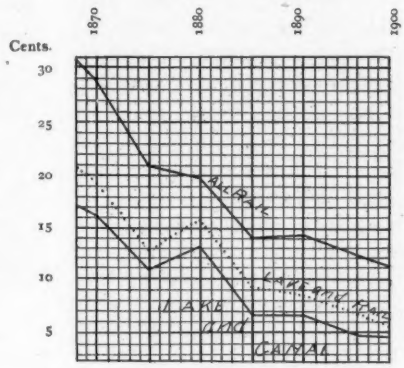

FIG. 37.—Freight rates on wheat per bushel in five-year periods, 1868–1898.
"Report on New York Canals," p. 190.

* The rates since 1868 are given as follows:

	ALL RAIL.	LAKE AND RAIL.	LAKE AND CANAL.
1868.....	30.49	20.76	17.33
1880.....	19.90	15.70	13 27
1890.....	14.31	8.50	6.72
1898.....	11.55	5.40	4.82

"Report on New York Canals," p. 190.

relatively short. The low freights on the railroads in competition with the Lake route must be due largely to water competition. The same tendency is shown in Fig. 37, where the canal rates are a factor. Moreover, it is probable that the actual railroad rates were often lower than the published rates shown in the graphs, or the rail roads could not have secured so large a portion of the traffic or competed so successfully even during the navigation season.*

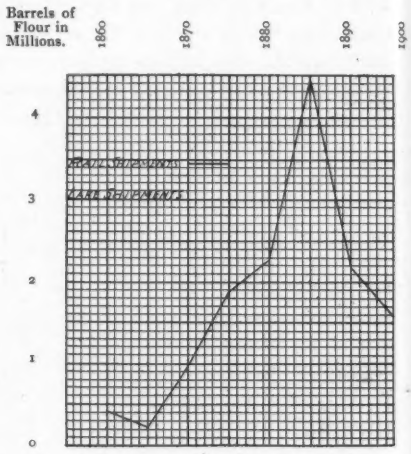

FIG. 38.—East-bound shipments of flour from Chicago in five-year periods, 1860–1900.
Tunell's "Statistics of Lake Commerce," p. 53.

The effective competition of the railroad with the canal preceded that of the railroad with the Lake route. Prior to the seventies the Lakes were the favourite route for grain shipments. As is usually the case, the manufactured product of greater value for given weight passed to railroad carriage before the raw material. In the sixties flour shipments eastward by rail began, and continued to exceed those by boat (Fig. 38). About 1873 the railroads became strong competitors for east-bound wheat shipments (Fig. 39), and in 1876 a considerable portion of corn shipments passed to railroad carriage.†

Much of this grain movement by railroad centers upon New York and makes that port the principal port of grain export in the United States. So long as the water route is an actual or potential competitor of the railroads, the railroads will be compelled to make rates to move freight to New York.

The easy pathway by the Lakes to the Sea was retroactive in its effects. The growing population in the hinterland of New York not only sent an increasing export tonnage to New York, but it became a consumer of a rapidly increasing tonnage of imports.

* George G. Tunell, "Statistics of Lake Commerce"; 55th Congress, 2nd Session, Document No. 277, 1898, p. 36.

† Tunell, *ibid.*, page 54.

To a considerable extent, exports control imports, and, other things being equal, ships will bring their cargo to the port where they can best secure a return tonnage. The pre-ëminence of New York, therefore, as the leading port of import in the United States, grows out of her export trade.

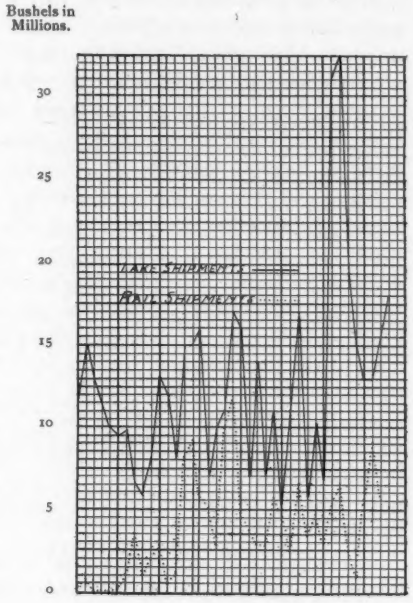

FIG. 39.—East-bound shipments of wheat from Chicago by rail and by lake from 1860 to 1900. Tunell's "Statistics of Lake Commerce," p. 53.

THE MINOR GEOGRAPHIC FACTORS.—The discussion heretofore has been given mainly to the larger hinterland of New York, upon which the supremacy of the city has been founded. Minor factors have been important, although, with the excellent route from the city to the interior, it is probable that the export trade along that route would have located a great export port in the vicinity of New York, had its local advantages been of the poorest for commerce.

THE HARBOUR.—An ideal harbour should afford: (1) anchorage and easy movement for the largest vessels; (2) easy access to the sea; (3) moderately deep water near the shore for convenient and easy wharfage; (4) protection from waves and winds; (5) easy fortification; (6) freedom from ice.*

The same continental sinking that drowned the Hudson also produced Long Island Sound. This waterway, with its tributary estuaries on the north, afforded a protected course for the early traffic between New York and southern New England. The lower Hudson, which, with the East River, constitutes the harbour of Greater New York and Jersey City, has an extent and depth sufficient for many times its present commerce. The depth of this fine

* "The Organization of Ocean Commerce," J. R. Smith, 1905, p. 124.

harbour is of increasing importance, for the tendency of modern commerce is toward ships of larger and larger draught.

The opening of a harbour to the sea is a vital and often troublesome factor. The success or failure of a modern harbour often depends upon its accessibility to the vessels of deep draught which modern commerce demands. A common difficulty with an estuary harbour, such as that of New York, is the bar across the channel that is built where the outward flowing river loses its carrying power. Several features in New York harbour reduce this difficulty. The Hudson River carries but little silt. It has been mentioned before that its catchment basin is below the average for rivers of the same length. The Mohawk and Upper Hudson deposit most of their load far above the harbour, shortly after reaching tide water. Moreover, the Hudson is narrow and the flood and ebb tides are strong. The ebb tide through the narrows has cut the main channel leading to the city, and the passage of the ebb and flood tides past Sandy Hook has extended that channel seaward.* The most serious menace to the harbour is the load which the shore currents are bringing northward along the coast of New Jersey. They tend to extend Sandy Hook across the harbour mouth. There is also some shore drift from the Long Island shore.†

A comparative measure of the value of this tidal scour is found in the dredging expenses of various harbours. According to the records of the House documents from 1895 to 1903 the expenditures for harbours, largely for dredging and clearing, were as follows:

New York	$1,035,300.00
Philadelphia	2,710,000.00
Delaware Breakwater	1,185,000.00
Boston	1,501,168.75
Baltimore	470,000.00
New Orleans	1,404,845.30

The showing is very favourable to New York Harbour. If the Delaware Breakwater expenses are added to those of Philadelphia, the expense of that port is nearly four times as great as that of New York.

The comparative freedom from silt and the strong tidal scour in the Hudson and East Rivers, together with the drowning of the region, afford deep water near the shore. This factor makes easy

* L. M. Haupt, "Changes along the New Jersey Coast." Annual report of the New Jersey Geological Survey, 1905, p. 83.

† Haupt, *ibid.*, p. 79.

the building of piers and also permits the vessels to lie at right angles to the shore, thus saving shore space and allowing commerce to concentrate*. Thus the enormous commerce of the city is concentrated at the lower end of Manhattan Island and along the opposite shores in New Jersey and Long Island. The rental of wharfage privileges yields to the city over $2,000,000 per year.†

THE TERMINAL MORAINE.—The terminal moraine which crosses at the Narrows, besides accentuating the tidal scour by narrowing the channel, furnishes sites for easy fortification. The narrow entrance to Long Island is another factor of the same sort, and the projecting Sandy Hook is utilized for the purposes of fortification. The Highlands, the Triassic Trap Ridges on the north, and the terminal moraine on Long Island give some protection from wind. Ice does not interfere, to any extent, with the traffic of the harbour, as the water is too salt for easy freezing, both in the harbour and in the tributary Hudson.

THE COAL FIELDS.—The anthracite and bituminous coal fields of Pennsylvania are an exceedingly important factor in the development of modern New York. Cheap and good fuel, together with excellent transportation facilities to the coal fields, have aided in making New York a leading manufacturing as well as commercial city. New York has also a large coastwise coal trade.‡

THE GEOGRAPHIC-SOCIAL AND ECONOMIC FACTORS.—The preceding discussion has dealt with what may be called the physical geographic features of New York. Another phase of the city's geographic development may be considered under the head of social factors. They deal not so much with the influence of physical factors as the influence of man upon man. Here the distinction between influence dependent upon earth control and those emanating from complex social causes is not clear.

MANUFACTURES.—Given any cause for a city, whether, like St. Petersburg, it originates in a royal edict, a fortified site, as Rome, or a situation favourable for commerce, as New York, and a population of diversified occupations will gather. The primary occupations of a modern city are manufacturing and commerce, but a host of subsidiary trades and occupations grow up. A compilation from

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* Smith, *Ibid.*, p. 125.

† Municipal Affairs, 1898, p. 2.

‡ In 1904 the following shipments took place:

	ANTHRACITE	BITUMINOUS
New York	7,647,432 T	19,340,002 T
Philadelphia	3,306,846 T	5,066,386 T
Baltimore	217,705 T	1,892,740 T

the census of 1900 shows the importance of trade and manufactures in four cities.

Percentage of persons engaged in trade and transportation:

Greater New York	35	per cent.	of	total working population.
Philadelphia	24	"	"	"
Boston	34	"	"	"
Chicago	32	"	"	"

Percentage of persons engaged in manufacturing and mechanical arts:

Greater New York	37	per cent.	of	total working population.
Philadelphia	41	"	"	"
Boston	32	"	"	"
Chicago	35	"	"	"

The modern commercial city tends to become a manufacturing center. Good transportation, concentration of capital, access to markets, are factors. Many goods are best manufactured at the place of meeting of their constituent materials. The exports for 1900 had 35.6 per cent. of products manufactured in the city and its immediate environs.* New York is thus seen to be the greatest manufacturing as well as the greatest commercial city in the United States. Including the adjoining counties with the cities, the following figures of the value of manufactures are given in the Twelfth Census:

Greater New York and vicinity	$1,798,020,115.00
Chicago " "	1,004,414,962.00
Philadelphia " "	732,137,957.00
Boston " "	576,705,204.00

The influence of the variety of imports and exports at New York is reflected in the manufacturing. There is no predominating manufacturing industry. The number of establishments is large and the capital invested in each establishment is relatively small.

These conclusions are readily inferred from the following figures, as to the number of manufacturing establishments:†

Greater New York and Jersey City	38,846
Philadelphia	15,887
Chicago	19,203

	CAPITAL PER ESTABLISHMENT.	WAGE EARNERS PER ESTABLISHMENT.	VALUE OF PRODUCT PER ESTABLISHMENT.
Greater N.Y. and Jersey City.	$24,748	11.9	$35,894
Philadelphia	29,994	15.5	38,803
Chicago	27,805	13.6	46,333

* "The Erie Canal and Transportation": E. P. North, *North American Review*, January, 1900.
† "Twelfth Census," Vol. VIII, Part I.

The following list includes the principal articles in the manufacture of which New York stands first, according to the reports of the Twelfth Census:

Newspapers and periodicals.	Hats and caps.
Printing and publishing.	Men's clothing, factory product.
Bookbinding.	Women's clothing, " "
Shipbuilding.	Brooms and brushes.
Shirts.	Coffee and spice roasting.
Wholesale slaughtering.	Cordage and twine.
Soaps.	Malt liquors.
Cigars and cigarettes.	Musical instruments.
Steam fittings.	Patent medicines.
Men's furnishing goods.	Foundry and machine-shop products.

These industries are founded upon a large consuming population, a supply of varied materials, cheap fuel and, probably most of all, upon the abundant and cheap labour. This latter factor, a result of dense population, is common to all cities, but in this case it is, perhaps, accentuated by the fact that the city is on an island and the population can not easily avoid congestion by spreading to suburbs. Moreover, the position of New York, as the principal port of immigration, produces a constant surplus of cheap labour.

TRADE AND TRANSPORTATION.—Perhaps the most spectacular factor in the growth of a commercial city is the break in transportation which usually occurs.* The freight from the river and railroads at New York is transferred to vessels for the coastwise or foreign trade. A mere transfer of goods without change of ownership will cause a considerable concentration of population, but the place where a transfer both of goods and ownership occurs must be a commercial center.† Merchants, brokers, bankers, and others, are required to handle the transfer, and their presence requires a still larger body of workers of other classes.

It is interesting to note that early Dutch colonists realized the value to their town of this transfer. During Van Twiller's administration, all vessels touching at New Amsterdam were required to unload and and reload or transfer; if this were not done a heavy toll was imposed. This transfer located a class of merchants and traders and doubtless contributed not a little to the prosperity of the town.‡ The mere value of a physical transfer to vessels is seen in the statement, made in 1901, that every ship that clears from New York has caused the expenditure of from $2,000 to $20,000.§

* *The Theory of Transportation*, C. H. Cooley, p. 91.
† *The Growth of Cities*, A F. Weber, 1905, p. 73.
‡ *Memorial History of New York*, p. 191, Vol. 1, Wilson.
§ "Harper's Weekly," Dec. 21, 1901, *The Commercial Losses of New York.*

It would be interesting to know how much of the five hundred million dollars' worth of exports from New York are transferred in ownership, but no statistics showing this have been found. However, an idea can be gained from the statistics given in the Board of Trade Reports of the city of Chicago. Taking the mean of the years, 1875, 1880, 1885, 1890, it appears that the following percentages of the entire shipments east from Chicago are billed direct to Europe on through bills of lading:

Wheat	8.3 per cent.
Flour	9.1 per cent.
Corn	16.7 per cent.

In view of these facts, it seems reasonable to believe that at least 80 per cent. of the breadstuffs change ownership at the exporting port. This for the twenty years, 1886–1905, would give an annual change in ownership of breadstuffs alone amounting in value to $30,000,000.* Assuming that half the annual exports and imports at New York change ownership, it would involve a business of $500,000,000, a sum which would account for that city's being the financial center of the country.

The imports at New York considerably exceed the exports, and their value is over half of the total value of the imports of the United States. This excess of imports clearly arises primarily from the use of the port for exports. Exports in a measure control imports. The cheap water route westward from New York not only furnishes cheap rates, but by its potential competition, keeps down freight rates on railroads. The concentration of railroads and canal at New York has made the port a great point of export, and this in turn has provided facilities for imports.

The commercial growth, therefore, of New York is due primarily to its easy route to the interior. The splendid harbour and adjacent coal fields are important factors, the latter allowing the great development of manufactures that normally occurs in a commercial centre. The Mohawk pass offered an easy gradient, and the Mohawk Valley and Iroquois Plain offered inducements for a dense population. From the ease of construction and the demand of the inhabitants of the region came the impetus for canal and railroad building. The rapidly developing interior found a path for its exports and imports by way of the Lake, railroads and canal, and the transfer at the harbour built up a commercial and financial

* For the twenty years, 1886–1905, the average annual value of the exports of wheat from New York was $20,991,033; of flour, $17,431,794.
Tables in the "Report of the N. Y. Chamber of Commerce," 1905–6.

metropolis. The same facilities that invited exports to New York provided a way for imports, and the one invites the other. The presence of a trading class is retroactive and requires the presence of other classes, and this tends to build up a city. Excellent transportation, the supply of varied materials for manufactures, convenient coal and cheap labour have given to Greater New York great and varied manufactures.

There is some evidence that the momentum which New York has enjoyed because of easy access to the interior is somewhat decreasing. New Orleans and Galveston have become competitors for the interior grain export trade. The other Atlantic ports have increased their export trade. From 1868 to 1899 the percentage of the entire export values of the United States that passed through New York has shown a uniform annual relative decline of about eight per cent.—a decline small, and, perhaps, to be expected, but which, if continued, will diminish the lead of New York in export values, and, therefore, will tend to decrease the imports at that port, relatively at least. Moreover, the exports of grain in which the port of New York formerly was so prominent have shown a marked relative decrease in the last thirty years, as is shown by the following figures from the Report of the New York Produce Exchange from 1902–3, page 28:

New York's percentage of flour, wheat and corn exported from the six principal Atlantic ports:

	FLOUR. PER CENT.	WHEAT. PER CENT.	CORN. PER CENT.
1873–82	70.42	63.35	47.70
1883–92	46.06	60.22	46.57
1893–1902	38.14	48.33	28.16
	1892		
New York	32.48	38.50	24.71
Boston	7.05	16.31	6.51
Philadelphia	19.74	17.01	19.62
Baltimore	24.07	18.25	36.44
Norfolk	1.36	.25	3.13
Newport News	15.30	9.68	9.59

The business men of New York realize the danger and, largely through their efforts, the citizens of New York State, in 1903, voted to enlarge the Erie Canal so as to allow the passage of barges of one thousand tons capacity. It is hoped by this increased capacity to restore to the Erie Canal something of its old impor-

tance. Whether the plan will succeed is an exceedingly interesting economico-geographic question, the solution of which rests with the future.

Henry Hudson discovered a northwest passage, the value of which he could not foresee; a passage which, indeed, located a great city, but whose greatest value is the opportunity which it gave to the inhabitants of the hinterland of that city.

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TUBERCULOSIS AND CLIMATE.

BY

ROBERT DEC. WARD.

There is no more important subject on the border-land between medicine and climatology than that which concerns the climatic treatment of tuberculosis. In a recent paper, entitled "The Action of a High Dry Climate in the Cure of Tuberculosis" (*Bull.* Univ. New Mex., Whole No. 47, Biol. Ser., Vol. III, Art. 13, June, 1908), Dr. John Weinzirl advances a new theory regarding the value of a high dry climate in the cure of tuberculosis. The author summarizes the various explanations which have been given to account for the favourable action of these climates, and shows why these explanations seem to him inadequate.

It has generally been assumed that mountain climates, by leading to enlarged lung capacity and increased respiration, result beneficially for the patient. Dr. Weinzirl believes that it is doubtful whether any material increase takes place. The highly ozonized air of high altitudes has been thought by some of hygienic importance, but the author points out that this hypothesis has not been substantiated by facts, the ozone in high dry climates being small in amount. A generally accepted assumption is that dry air assists in drying up and curing lesions in the lungs, but Dr. Weinzirl calls attention to the fact that the air in the lungs is saturated with water vapour in all climates, and that the nature of the tuberculosis lesions in the lungs precludes the possibility of any considerable desiccation taking place.

Some authorities have assumed that the sparse population and the pure, fresh air are of essential importance. As the air in forests and over open prairies is often equally pure, this factor is not considered distinctive for the benefit noted in high dry climates. The increased amount of sunlight, especially the increase in blue, violet and ultra-violet rays, which has been held to be the beneficial factor, is found not to be of undoubted help. Another hypothesis is that a high dry climate affords greater opportunities for out-door life and exercise, the real benefit being due to one or more of the causes previously noted. This, again, does not seem to Dr. Weinzirl to offer any adequate or satisfactory explanation.

It is the conclusion of the author that the action of a high dry

climate in the cure of tuberculosis consists essentially in the stimulation afforded to the body by the daily variation in temperature; altitude, dryness, and sunlight are important mainly as being instrumental in causing this daily variation. These factors by themselves exercise a certain hygienic influence, but the temperature change produces a true physiological reaction. Incidentally, the variation in temperature affords cool nights, with accompanying refreshing sleep. Together these two factors afford the patient a vantage ground from which to wage a more successful combat against the forces of the disease.

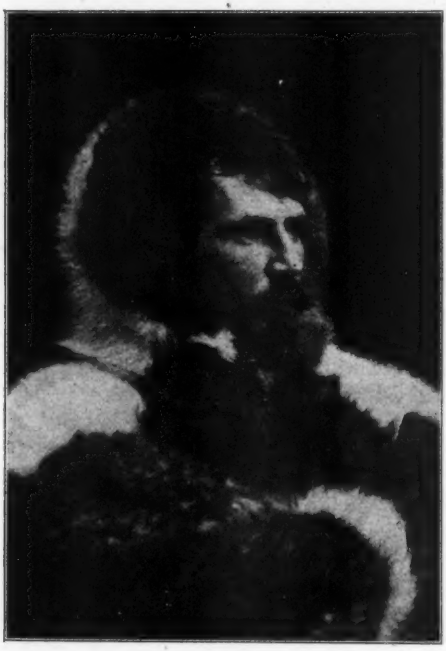
It is obvious that, in view of the complex series of elements which unite in producing climate, it is unlikely that any one particular factor is the really essential thing in the climatic treatment of tuberculosis. The beneficial results which have attended the treatment of the disease in mountain climates, especially in dry regions, have doubtless come from the remarkable combination of elements which is embraced, in the minds of climatologists, in the term "mountain climates." To attempt to pick out one, or two, of these elements as being of the greatest importance will seem to most uninitiated persons as unlikely to lead to any absolutely convincing results.

MYLIUS-ERICHSEN'S MAP OF NORTH-EAST GREENLAND.

The map here printed is based upon the survey of the northeast coast of Greenland by Dr. Mylius-Erichsen, which appears in *Ymer* of the Swedish Anthropological and Geographical Society (No. 3, 1908). The map shows how widely the coast differs from our earlier conceptions of it. The broken line extending from Lambert Land northwest to Cape Glacier shows the supposed general direction of the unexplored part of the Greenland coast, as hitherto represented on the maps. It was believed that its trend was in a general northwest direction from Lambert Land to the Independence Bay of Peary. The fact is that the coast, following its indentations, extends for about 300 miles in a general northeasterly direction till its most eastern point nearly touches 12° W. longitude from Greenwich. We now know that about 1,000 miles of tortuous coast line stretches between Cape Bismarck, the highest point

reached by Captain Koldewey in 1870, and the northern shores of the island.

The great sledge journey of Mylius-Erichsen on which he charted these unknown shores began on March 28, 1907, and has been described in the *Bulletin* (Sept., 1908, pp. 553–4). A few details may be added here, showing the geographical reasons that contributed to the fatality that overtook Mylius-Erichsen and his comrades, Lieut. Hargen and the Greenlander Brönlund. The party set out with the intention of surveying every mile of the coast, till they joined their charting with that of Peary, at Independence Bay. This purpose was accomplished, but at the cost of their lives.

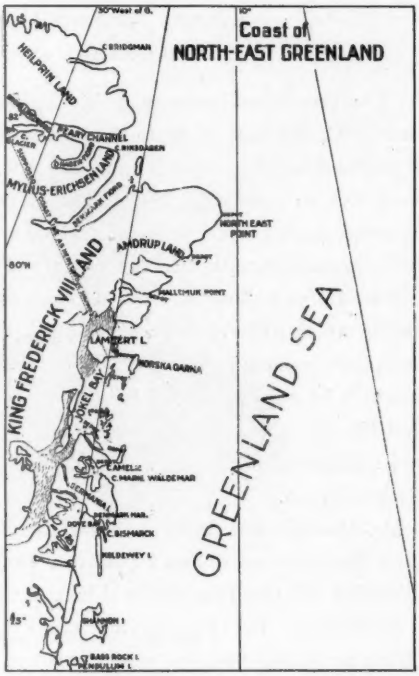


L. MYLIUS-ERICHSEN.

It was believed that the northern work could be completed within thirty days and that the explorers might return without difficulty to their most northern food cache and replenish supplies for the journey back to the ship. At any rate, Mylius-Erichsen took north with him all the food for men and dogs that he could carry. It was owing to the hundreds of miles of tortuous coasts that were revealed as he travelled north, which added so greatly to the mileage and to the duration of the journey, that the food supplies were exhausted before their return to the nearest food cache.

The trend of the coast suddenly turned the party sharply to the northeast, and many days were spent in rounding the great peninsula, which extends far out in the Greenland Sea. Soon after they had doubled this point they found themselves following up an inden-

tation, Denmark Fiord, extending from the sea 90 miles inland, and to make their map complete they traced this fiord to its end and followed its other coast back to the sea again. This 180 miles of unexpected travel practically sealed the fate of the three men. The coast line then took them, for a day's march, towards Independence Bay, when again they were confronted by another deep fiord. They named it Hagen Fiord, and laboriously followed its coast, making a complete survey of it. They at length connected their surveys with those of Peary. But the summer day was beginning to fade and semi-darkness came before they had proceeded far on their return journey.



These pages have already recorded the finding of Brönlund's body with the bottle containing the survey sheets slung around his neck. Perhaps the great result of this exploration would never have been known if it had not been for this fortunate circumstance. It is thought that Mylius-Erichsen probably did not venture to carry his diaries and collections over the inland ice with him, but left them in some safe depository at Denmark Fiord, where they may ultimately be recovered. This picture of Mylius-Erichsen is reproduced from *Ymer*.

A committee has been formed in Denmark to erect a memorial to Mylius-Erichsen. It is expected that the memorial will take the form of a lighthouse to be erected on the Danish coast.

OBITUARY.

GEORGE CHANNING HURLBUT.

DIED DECEMBER 26TH, 1908.

The recent unfortunate accident resulting in the death of Mr. George C. Hurlbut is in no small measure a grave calamity. Few of those who have been connected with the work of this Society have left so profound a sense of loss, and none had created, by personal qualities of the highest kind, a greater number of sincere and devoted friends. In the seventy-fifth year of his age he was still an active and earnest worker, and for the quarter of a century during which he held the position of Librarian and Editor of the BULLETIN he steadily strove to increase the efficiency of the work in which he was engaged. It is to his modest and untiring labours that the BULLETIN owes in the broadest sense its present position and influence, and it is in no small degree a monument to his capable editorship.

Mr. Hurlbut was born in South Carolina, and shortly after the Civil War he went to San Francisco, where for several years he was Librarian of the Mercantile Library, and where his work is still remembered. In 1883, having come to New York, he became Librarian of this Society, which position he occupied until the time of his death, gradually identifying himself closely with the Society's work, and striving in every way toward the maintenance of that ideal of educational growth and influence of which every organization of like nature must be the expression.

He was possessed of a courtesy and consideration which aided him to make and to keep a great number of cordial friends, and his death has taken from the American Geographical Society a fellow-worker not soon to be replaced, and a personality beloved more deeply than can be easily comprehended by those who did not have the good fortune to know him.

GEORGE CHANNING HURLBUT.

RESOLUTIONS OF THE COUNCIL.

WHEREAS: Mr. George Channing Hurlbut, Librarian of the American Geographical Society, on December 25 last departed this life; and

WHEREAS: The members of the Council and of the Society have thus lost a colleague and officer, in speaking of whose death there is demanded an expression of universal love for his personality, coupled with sincere admiration for the work he has accomplished. His qualities were those of truth and gentleness, and throughout the twenty-five years, during which he was Editor of the BULLETIN and Chief Librarian of this Society, his character made itself felt in the maintenance of that high ideal of dignity and scholarship to which the members of this Council may justly look with satisfaction and admiration. He accepted his trust with modesty, and with modesty he maintained it to the end. Our Society owes to him profound gratitude and lasting respect.

There is perhaps a certain fitness that a life for so many years faithfully devoted to the interests and efforts of others should itself be given up on Christmas Day.

Therefore be it resolved: That we, the Councillors of the American Geographical Society, on behalf of ourselves and its members, desire to make permanent memorial of our sense of deep bereavement, and to offer to the family of our deceased friend the assurance of our profound sympathy.

And be it further resolved: That this minute be entered on the records of the Society, and that a copy of these Resolutions be suitably engrossed and presented to the sorrowing family.

GEOGRAPHICAL RECORD.

AMERICA.

ASSOCIATION OF AMERICAN GEOGRAPHERS.—The Fifth Annual Meeting was held in Baltimore December 31, 1908-January 2, 1909, under the presidency of Mr. G. K. Gilbert. Professor Albrecht Penck gave a lecture before the Association at its opening session on Thursday evening, on "Man, Soil and Climate." Other features of the meeting were: the president's address by Mr. Gilbert, on the subject, "Earthquake Forecasts"; and a round-table conference on "Geography for Secondary Schools," conducted by Professor R. E. Dodge. The conference was held informally in connection with a smoker at the Johns Hopkins Club on Friday evening. About thirty papers were read by members, representing meteorology and various phases of physiographic, biological, human and educational geography. The important subject of cartography was also well represented. The officers for the ensuing year are: President, W. M. Davis; First Vice-President, L. A. Bauer; Second Vice-President, E. R. Johnson; Secretary, A. P. Brigham; Treasurer, N. M. Fenneman; Councillors, Cyrus C. Adams, R. S. Tarr and R. E. Dodge. The place of the next meeting will be fixed by the Council. A. P. B.

THE BALTIMORE MEETING.—The Baltimore meeting of the American Association for the Advancement of Science was probably the largest gathering of scientific men that has ever been held. The attendance is believed to have been in excess of 2,500. Among the public lectures having geographical bearings may be mentioned the addresses by Prof. Penck of Berlin on "Man, Climate and Soil"; Mr. W. A. Bryan of Honolulu, on "A Visit to Mount Kilauea"; and Major Squier, U. S. A., on "Recent Progress in Aeronautics." The celebration of the Darwin Centennial was the most conspicuous event of the meeting.

The Vice-President for the coming year of Section E (Geology and Geography) of the American Association will be Dr. R. W. Brock, Director of the Canadian Geological Survey. The winter meeting next year will be held at Boston under the presidency of Dr. David Starr Jordan, President of Stanford University. It was recommended that the following meeting be held in Minneapolis. The Council of the British Association has invited the members of the Association to attend the Winnipeg meeting in August next.

RAILROADS IN ALASKA.—While the unfavourable financial conditions retarded railroad building in Alaska in 1908, considerable progress was made, especially along the Copper River. This line was extended last season from Cordova to Childs Glacier, 47 miles. Steamers will run in connection with the road from Abercrombie Rapids, so that this year the long overland journey from the coast to reach the Chitina copper belt will be avoided. As railroads in Alaska are of much public interest, the following statement of mileage in operation, compiled from the report of the Geological Survey on the mining industry in Alaska, is given here:

Seward Peninsula: Seward Pen. R. R., Nome to Shelton, 80 miles; Paystreak to Branch S. P. Railroad, 6.5 miles; Council City and Solomon River R.R., Council to Penelope Creek, 32.5 miles; Wild Goose R.R., Council to Ophir Creek, 5 miles.

Fairbanks: Tanana Valley R.R., Fairbanks and Chena to Chatanika, 46 miles.
Kenai Peninsula: Alaska Central R.R., Seward to near head of Turnagain Arm.
Copper River: Copper River R. R., Cordova to Childs Glacier, 47 miles, up to September 17, and probably 11 miles have since been built.
White Pass: White Pass and Yukon R.R., Skagway to White Pass, 20.4 miles.
Yakutat Bay: Yakutat Southern R.R., Yakutat to Situk River, 9 miles.

ALLUVIAL DEPOSITS IN SOUTHERN CALIFORNIA.—The nature of the deposits in the great series of coalescing alluvial fans of which the Cucamonga and adjacent California quadrangles form widely-used examples, is described by Mendenhall.* Four hundred and fifty square miles of lowlands along the south base of the San Gabriel Mountains near Los Angeles are discussed and their economic importance may be judged from the fact, that in the 55,000 to 60,000 acres irrigated, $1,000,000 is invested in wells and pumping plants. This acreage produces citrous and other fruits, and its value is at least $20,000,000.

The valley of southern California, with its basins and mountain ranges, is explained as chiefly due to faulting, warping, and erosion, the movement along fault lines indicating that such deformation is still in progress. The San Gabriel Mountains are in a much more advanced stage of their latest erosion cycle than the adjacent San Bernardino range.

> They present a labyrinth of canyons and ridges and peaks with no level area of any size. The ridges have narrow summits; the peaks are sharp; the streams are all evenly graded from source to mouth. In the San Bernardino Mountains, on the contrary, there are many wide upland valleys, forested and grassy glades and lakes or playas. * * * As the edge of these interior uplands is approached, the streams plunge into precipitous canyons, the slopes are as steep as earth and rock can stand, the roads and trails twist and turn and double to find devious and precarious way to the valleys below.

The alluvium which the streams from these mountains are carrying out to the basins is of two ages. The older gravels and clays, found only in benches and isolated knobs, are folded and sometimes highly inclined. They are usually of a dull-red color, due to the rather complete oxidation of their constituents. These older deposits, evidently formed under conditions similar to those in the present alluvial fans, have undergone diastrophic action. They complicate the conditions of ground-water circulation in the younger gravels.

The most recent gravels, carefully discriminated by Mendenhall as not glacial, slope gently from the mountains near which the slopes are steepest. Their surfaces form the bulk of the irrigated areas and through their porous layers the life-giving waters circulate, rising to the surface in artesian wells or by pumping. The annual rainfall in the plains is fifteen to twenty inches, increasing toward the mountains. The series of detailed maps showing the relationship of the areas of artesian water and of irrigated lands to the slopes of the alluvial fans and to the position of the "washes" is of decided interest. L. M.

THE BISON RANGE IN THE FLATHEAD INDIAN RESERVATION, MONTANA.—This Range, for which Congress last year appropriated $40,000, has been located north of Jocko River, near the towns of Ravali and Jocko. Approximately, 12,800 acres are embraced in the tract, which will be fenced by the Engineering Department of the U. S. Forest Service. Only $10,000 will be available for fencing the range and constructing the shelter sheds and other buildings. The remaining $30,000 will be paid to the owners of the land, many of whom are Indians. Funds

*W. C. Mendenhall, Ground Water and Irrigation Enterprises in the Foothill Belt, Southern California. Water Supply Paper No. 219, U. S. Geological Survey, 1908.

for the purchase of bison are being raised through the agency of the American Bison Society, which was largely instrumental in securing the appropriation. This Society, of which William T. Hornaday, Director of the N. Y. Zoological Park, is President, was founded in 1904, and the Montana Bison Range is the direct result of its efforts. Details of the management of the herd will be worked out as soon as it is purchased, and construction work on fences and buildings will also be begun.

POMO INDIAN BASKETRY.—This is the title of a monograph (Vol. 7, No. 3 of Univ. of Cal., Pub. in American Archæology and Ethnology), by S. A. Barrett. It has 144 pp., with many illustrations. Basketry reached a high state of perfection among the California Indians, who found many tough pliable fibers which might be woven or coiled into articles of use. Among no other California people was there so great a variety in basketry as among the Pomo, who occupied the greater part of Sonoma, Mendocino and Lake Counties. The general method pursued by Mr. Barrett in his studies was to question natives of the three dialectic groups of Pomo concerning the 840 patterns shown in the photographs of 321 Pomo baskets. The larger part of the volume is given to a description of these basketry patterns. These baskets in aboriginal times took the place of almost every sort of utensil for the gathering, transportation, storage and grinding of vegetable products, cooking and serving foods and for ceremonial and mortuary purposes.

AFRICA.

COMMERCIAL POSSIBILITIES IN WEST AFRICA.—The paper with this title, which Viscount Mountmorres recently read before the Institute of Commercial Research of Liverpool University, has been published by the Institute. It is chiefly a study, in some detail, of the commercial opportunities in British West Africa concerning which the author holds the most encouraging views. The substance of the paper is summed up in the concluding paragraph:

> Given a large area of productive tropical land, within easy access of Europe, provided by nature with many river mouths and harbours, peopled by a sufficient population of skilful and intelligent workers, capable of easy development, and of being administered more cheaply than any other part of the British dominions, and we are fully justified in viewing, with confident anticipation of a brilliant success, the commercial future of British West Africa.

GEOLOGICAL SURVEY OF THE TRANSVAAL.—The *Report* for 1907 of the Director announced that it was intended in 1908 to begin the official survey of the Witwatersrand and describe all its geological formations which have attracted most attention. Among the geological results thus far are the arrangement and classification in the colony of the larger groups of formations, their correlations with the formations of neighbouring colonies, and some increase in our knowledge of the Transvaal coal-measures on the High Veld and of the former glaciation of the country. The *Report* gives a detailed account of the work accomplished in 1907 and is illustrated by maps in colours and by sections and photographs. (See new maps.)

ASIA.

PROF. CHAMBERLIN'S SPECIAL WORK IN CHINA.—Prof. T. C. Chamberlin, of the University of Chicago, after presiding at the Baltimore meeting of the American

Association, left with his son, Dr. Rollin Chamberlin, for San Francisco on the way to China. He will be joined there by Prof. Ernest D. Burton, also of Chicago University. These gentlemen have been sent to the Orient by the University to survey the educational situation in several Eastern countries with especial emphasis on China where the status of educational development will be closely studied. The general scope and purpose of their work is outlined in the following extract from the commission issued to them by President Judson of the University:

In the study of educational conditions and needs in China it is important that information be obtained from every source accessible. Your reports should indicate what seem to be the most important educational needs in that country, what work is actually under way, how far that work is well directed, and whether additional educational agencies and activities would contribute to the best interests of China in accordance with the highest ideals of modern civilization.

The general purpose of your work in oriental countries is to inquire into the possibilities of bringing about closer relations in educational matters between the east and the west with mutual advantage; in particular to determine whether educated men and those interested in education in China and in America can become of service to one another in the promotion of education in the world at large.

It is understood that prominent officials of the United States Government are interested in this investigation, that the co-operation of both educators and officials in China is assured and that a very large sum of money, from private sources, will be devoted to the promotion of education, on modern Western lines, in China if it is found that the empire is ready for such an innovation.

AUSTRALASIA.

Native Fauna of Australia.—In his annual address before the Linnean Society of New South Wales (*Proceedings*, No. 129), President Lucas says that the Australian native fauna is largely unique, and is remarkable for the comparatively small number of destructive vertebrates which, from man's point of view, may be looked upon as pests. The serious enemies to man are the insects, locusts, grasshoppers, caterpillars, beetles and the small fry that destroy the trees, shrubs and herbs. The marsupials are mostly fur-bearing animals, and their pelts are likely to become increasingly valuable in the markets of the world. Every year millions of opossum skins and hundreds of thousands of macropus skins are exported to the Old World at good prices. The farmer and the farmer's wife, the farmer's sons and the farmer's daughters make pin money by skinning the opossums. These animals are necessarily becoming greatly reduced in numbers, and in many districts are practically exterminated. The kangaroos and wallabies are shot for sport, for their pelts, for their soup-making tails, or because they are rivals of the sheep and cattle. Is Australia prepared to lose altogether its fur-bearing marsupials? The speaker said he had inquired at times among practical men, and found that at present prices it is much more profitable on fairly good land to rear sheep and cattle than to rear kangaroos and wallabies. In poor country, rocky and hilly, the comparison is not so unfavourable to the latter. The feasible policy, then, seems to be to protect the marsupials to such an extent as to prevent extermination on the good grounds, to give them a good chance in poor country, and to set aside areas, the Government on a larger scale, as in national parks and reserves, and broad-minded landowners, as some are doing, on a smaller scale, in which a stock of marsupials may be preserved. Then, when prices are favourable, it will be at least possible to develop on a

feasible scale a fur industry which may compare with the ostrich farming which has been found so profitable in Cape Colony.

In 1903, New South Wales prescribed a close season from August 1 to January 31 of each year for the red kangaroo, the wallaroo, the native bear and some other animals. It is hoped that the list will be extended to include the other fur-bearing marsupials.

EUROPE.

LITERATURE RELATING TO ICELAND.—The Cornell University Library has issued the first number of an annual under the name of "Islandica" (Price $1), devoted to Iceland and the Fiske Icelandic Collection in the Cornell Library. It is edited by Mr. George William Harris, Librarian. The first volume is a "Bibliography of the Icelandic Sagas and Minor Tales," by Halldór Hermannsson. The formation of this Icelandic collection was the work of a lifetime, for its beginning was made by Mr. Fiske when a student in the University of Upsala more than fifty years ago. It contains about 9,000 volumes.

POLAR.

A MAP CORRECTION.—A mistake occurs in the map of the Coast of North-east Greenland prepared by the late Mylius-Erichsen, which should not be introduced into atlases. That explorer attached the name of Peary Land to the southern part of the largest island in the archipelago north of the Greenland coast. Commander Peary himself gave the name of Heilprin Land and Melville Land to the southern regions in this island. With the approval and by the desire of geographers in America and Europe, the extreme northern part of the island of Greenland, made known to the world by Commander Peary's remarkable sledge journey of 1892 on the inland ice, was named Peary Land in 1896. The suggestion was made by the Geographical Club of Philadelphia and was seconded generally by Arctic authorities.

POSITION OF THE SOUTH MAGNETIC POLE.—At the last meeting of the British Association, Mr. L. C. Bernacchi presented a paper on the results of physical observations taken on the National Antarctic expedition by the *Discovery* in 1902-4. The magnetographs clearly showed that the regular diurnal variation of declination is from five to six times as large as that at Kew. Even during the months when the sun is continuously below the horizon, the diurnal range remains at least double that at Greenwich at midsummer. In order to determine the position of the South Magnetic Pole by means of all the declination observations taken at the winter quarters, at sea and on sledge journeys, the results were plotted and the direction of the magnetic meridians as indicated by the observations extended towards the magnetic pole. The probable position of the pole as worked out by this method is latitude 72° 50′ S., longitude 156° 20′ E. All the inclination results were plotted on a chart and lines of equal inclination drawn, from which the probable position of the pole was indicated to be in latitude 72° 52′ S., longitude 156° 30′ E. The agreement between this position and that determined by the declination results is remarkable and may be considered as corroboration of the results. (*Electrical Engineering*, Vol. 4, p. 432.)

OCEANIA.

First Crossing of Bougainville—Prof. Dr. Sapper and the Governor of German New Guinea were the first white men to cross, in July last, the German island of Bougainville, in the Solomon Archipelago. Few whites who have been on the coasts of this archipelago have undertaken to push into the interior, on account of the unfriendly attitude of the natives. Dr. Sapper and his companion had no trouble with them. They crossed the Crown Prince Mountains at an elevation of 1,500 meters and their journey from coast to coast, 51 kilometers, occupied five days. Along their route mammalia were very poorly represented, and the island is not nearly so rich as Kaiser Wilhelmsland and New Pomerania in varieties of birds. The coastal plain on the east side of the island abounds in fine marketable timber. On the east side the population lives to a height of 600 meters, and one village was found on the west side at an elevation of 900 feet above the sea. The western part of the island is sparsely populated, and all the inhabitants are physically inferior and their condition is not nearly so comfortable as that of many of the Pacific peoples, owing to the incessant warfare among themselves and the fact that they have only small trade relations with the whites. There are only dialectic differences in the speech of the east and west coasts. (*Deutsche Rund. für. Geog. u. Stat.*, Vol. 31, No. 3, p. 140.)

OCEANOGRAPHY.

Salinity of the North Sea.—*Nature* (No. 2042) prints a chart of the mean salinity of the surface of the North Sea, which has been constructed from the international observations made during the years 1903-7. The general features of the chart are very simple. The highest salinities are found, first, around the Shetland Islands, and, secondly, in the neighbourhood of the Strait of Dover. The values are somewhat higher in the former region than in the latter, where the connection with the waters of the ocean is more remote. The salinity falls off rapidly in the Skagerrak, and is, on the whole, low everywhere in the vicinity of the coast. The salinity is shown by isohalines (or curves of equal salinity, the figures on the curves showing the number of grams of chlorides in 1,000 parts of water). At the mouth of the Cattegat, where the mean salinity is about 25, the annual variation is nearly 10 per cent.; at the mouth of the Skagerrak, where the mean salinity is about 31, the mean variation is about 5 per cent.; in the middle of the North Sea, with a mean salinity of 34.75, the mean variation is only about 0.2 per cent.; and in the region of the highest salinities off Shetland, of about 34.25 per cent., the mean variation is still less.

CLIMATOLOGY AND METEOROLOGY.

Studies of Frost at Williamstown, Mass.—The phenomena of frost are so directly controlled by local conditions of topography and of radiation, that in a certain sense each locality should be studied by itself in relation to the special conditions which there bring frost. For this reason, local investigations of frost occurrence are chiefly of interest over a restricted area, and yet all such investigations, if carefully made, throw light on a meteorological phenomena of great interest, and of high economic importance. Professor Willis I. Milham, of Wil-

liams College, Williamstown, Mass., has lately published the results of "A Two Years' Study of Spring Frosts at Williamstown, Mass." (*Monthly Weather Review,* August, 1908), in which the conclusions are as follows:

The so-called spring frosts may be expected from the last of April until the first of June, and occur on still clear nights, with the wind almost invariably from the north west. They are likely to come on the first or second night following the passage of a low, and the transition of the control to an area of high, pressure. This facilitates both the importation of colder air and radiation, the two processes which cause the low temperatures required. The air is so dry, and the dew-point so low, that it plays no part whatever in determining the amount of the drop from the maximum to the following minimum. The drop is, however, far from a constant, and must be estimated for each individual case, taking into account the probable characteristics of the afternoon and night.

If, after the probable temperature in the thermometer shelter has been estimated, it is desired to determine what the probable temperatures of low-growing vegetation in the coldest part of the limited area will be, three things must be taken into account: First, that plant temperatures go below the real air temperatures, because the plants are in the open without such a hindrance to radiation as is the shelter about a thermometer; second, that vegetation is located near the ground and not at the height of the instruments in the shelter; third, that the variation in temperature over a limited area may amount to several degrees. Were this computation carried out with the average values for Williamstown, about 2° would be allowed for exposure in the open, 3° for height, and 6° for variation between the shelter and the coldest part of the area. Thus the temperatures of vegetation in the open, near the ground, in the coldest part of the village, may be expected to average 11° lower than the estimated minimum in the shelter, as it is now located. R. DEC. W.

TYPES OF WEATHER IN MADRAS.—The increasing attention which is being paid to weather types is doing much to enliven, and to render more effective, the study of climates. For, as climate is the average of weather, no clear conception of a climate is possible without some understanding of the various types of weather which are concerned in making up the climatic means and extremes. A recent study along these lines is entitled "A Discussion of Types of Weather in Madras," by R. LI. Jones, and appears as Vol. XX, Prt. 4, of the *Memoirs of the Indian Meteorological Department* (fol. Simla, 1908, pp. 71, plt. 35). The report contains a series of charts showing the 8 A. M. pressure distributions which accompany and are peculiar to different kinds of weather in the south of the Madras Presidency. The most important types corresponding to the four seasons are: (1) the cold weather type; (2) the hot weather type; (3) the southwest monsoon type; (4) the northeast monsoon type. The periods of the year during which these different types normally prevail are as follows: (1) the end of December to the end of February; (2) the beginning of March to the end of May; (3) the beginning of June to the first week in October; (4) the second week of October to the third week in December. The charts, with explanatory text, will prove very useful to all students of Indian climatology. R. DEC. W.

IS THE CLIMATE OF THE BRITISH ISLES CHANGING?—An important paper was read before Section A of the British Association at its Dublin meeting, under the title, "Is our Climate Changing?", by Sir John W. Moore, and has since been printed in full in the *Dublin Journal of Medical Science* for October, 1908. The author gives a discussion of possible climatic changes in the British Isles, together with a bibliography of the subject. The observations made by the author in Dublin since 1866 are also discussed in a series of tables, with explanatory text. The conclusion reached is as follows:

In conclusion, I venture to submit that the facts which I have put forward in this paper prove that within the past six centuries, at all events, no appreciable change has taken place in the climate of the British Isles. There is not a scintilla of evidence to show that, within historic times, any such change has taken place in the past, or is likely to take place in the future. R. DEC. W.

THE CLIMATE OF PALESTINE.—In connection with the interest which is now being taken in the climatic conditions of the historical past, what Professor G. Hellmann, of Berlin, recently said before the Royal Meteorological Society of London may be worth noting (*Quart. Journ. Roy. Met. Soc.*, October, 1908). In the course of his investigations into meteorological folk-lore and early literature, Professor Hellmann finds that the first quantitative observations of rainfall were made in the first century A. D. in Palestine. The influence of rainfall on the crops was, without doubt, recognized in Palestine at an early date, and the results of the observations to which Professor Hellmann refers are preserved in the Mishnah, a collection of Jewish religious books apart from the Bible. The amount of rainfall then considered normal for a good crop Professor Hellmann finds to correspond closely with that deduced from modern observations made by Mr. Thomas Chaplin, at Jerusalem. From this fact, according to Hellmann, "it can be inferred that the climate of Palestine has not changed." R. DEC. W.

VARIOUS.

The Twenty-ninth Annual *Report* of the Director of the U. S. Geological Survey shows that the area of the country topographically mapped in the fiscal year 1907-8 was 25,658 square miles, making the total area surveyed to date in the United States 1,051,126 square miles, or about 35 per cent. of our territory. The area covered by topographical surveys in Alaska during the year was about 6,626 square miles.

Mr. Waldemar Lindgren of the United States Geological Survey has been appointed lecturer in Economic Geology at the Massachusetts Institute of Technology to succeed Prof. James F. Kemp of Columbia University.

Dr. J. Paul Goode of the University of Chicago gave an address before the Geographical Society of Chicago on Dec. 11 on the subject 'The Great Seaports of Europe."

Prof. George E. Hale, Director of the Solar Observatory of the Carnegie Institution, has been elected a Foreign Correspondent of the Paris Academy of Sciences in place of the late Asaph Hall.

Dr. Edwards of the Carnegie Institution is in Shanghai, where he is preparing to carry out a magnetic survey of China.

The yacht "Carnegie" is being built at Tebo's Yacht Basin, Brooklyn, for the Magnetic Survey Service of the Carnegie Institution. The ship will be as nearly as possible non-magnetic. Only a few hundred pounds of iron and steel are being used in its construction. Bronze and other metals which do not deflect the needle have been substituted. The vessel will be 155 ft. long, with a displacement of 568 tons with all stores and equipment on board. She is to be completed on or before July 1st next. The observation rooms will be on deck.

The Mont Blanc Observatory, erected for Director Janssen in 1893 at the summit of Mont Blanc, was practically destroyed in August last by the weight

of snow upon it. The instruments were saved and Mr. J. Vallot has undertaken to secure means for the erection of a new observatory.

Mr. E. G. Ravenstein, the well-known British geographer and cartographer, has printed for private circulation a booklet recording the varied literary work that has marked his long career.

The "*Bulletin*" of the Philippines Weather Bureau (Jan., 1908) gives a list of seventeen earthquakes which occurred in the archipelago in January last year, noting the intensity of the shocks, according to the Rossi-Forel Scale.

THE AMERICAN GEOGRAPHICAL SOCIETY.—A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth Street, on Tuesday, December 22, 1908, at 8.30 o'clock P. M.

Vice-President Greenough in the Chair.

The following persons recommended by the Council were elected to Fellowship:

Murray Boocock,	Samuel Hill,
Amasa Walker,	Edward Aberle,
James A. Burden,	Thomas A. Keck.

The Chairman then introduced Dr. William Elliot Griffis, who addressed the Society on "The Geography of Japan."

Stereopticon views were shown.

On motion, the Society adjourned.

OBITUARY.

ARTHUR JEPHSON.—Captain Arthur Jephson, the last survivor of the Stanley Expedition for the relief of Emin Pasha, died on Oct. 22d last, on his estate near Ascot, England, aged 58 years. He was the first of Stanley's party to reach Emin Pasha, and spent some time with him on the Upper Nile before Stanley and the rest of his expedition reappeared at Albert Nyanza. Jephson wrote an interesting volume relating to the Upper Nile as he found it under the government which Emin Pasha established in that vast region over which Mahdism had not been able to establish its ascendency. Five years ago Captain Jephson married a lady from California.

HELI CHATELAIN.—The friends in America of Héli Chatelain will regret to learn of his death in Lausanne, Switzerland, on July 22d last. In delicate health from childhood, he lived nearly a half century and accomplished useful work as a philologist, ethnographer and missionary. Coming to the United States in 1883, he studied theology and medicine, and in 1885 went to Angola, Portuguese West Africa, as one of the missionaries sent out by Bishop Taylor. While in Angola he actively prosecuted his scientific studies. His translations of some of the gospels into the Kimbundu language were published in Europe. Later he accompanied the Eclipse Expedition sent by our Government to Angola and made ethnological collections for the National Museum. He also published a Kimbundu grammar, and edited the African names in the Century Dictionary. His book "Folk-Tales of Angola" was published by the Folk Lore Society.

Among his contributions to the *Bulletin* of this Society were "Geographic Names of Angola, West Africa," and "Bantu Notes and Vocabularies," both in the volume for 1893. In 1897 he founded the "Phil-African Mission," with a station near the edge of the Angola Highlands, devoted to the industrial training of the natives under Christian influences. Late in 1907 he was compelled by ill health to return to Lausanne, where he died.

EMIL STEPHAN.—The expedition which the Prussian Ministry of Education organized a year ago for ethnographical work in the Bismarck Archipalego and other parts of the South Seas has been so unfortunate as to lose its leader, Dr. Emil Stephan, who died in New Mecklenburg on May 25. Dr. Krämer, already well known for his work in the Western Pacific, has taken charge of the expedition.

NEW MAPS.

AMERICA.

U. S. GEOLOGICAL SURVEY MAPS.

Two maps in the 29th Annual *Report* of the Director of the Survey, Washington, D. C., 1908:

(1) Map of the U. S. showing areas covered by the topographic surveys. Scale, 225 miles to an inch.

Coloured symbols show areas surveyed on the three principal scales of the Survey in 1907-8 and in earlier years.

(2) Map of the U. S. showing areas covered by the geologic surveys. Scale, 225 miles to an inch.

Shows areas covered by published and unpublished folios of the Geologic Atlas and areas of detailed and reconnaissance surveys.

ARIZONA.—Topographic and Geographic Sketch map of a portion of Western Arizona. Scale, 16 statute miles to an inch. *Bull.* 352 "Geologic Reconnaissance of a Part of Western Arizona." 1908.

Little has been done heretofore towards the accurate mapping of western Arizona south of the 35th parallel. This map, with the advantage of data acquired by recent railroad surveys, is reasonably accurate.

OREGON.—Reconnaissance Geologic map of South-Central Oregon. Scale, 6 miles to an inch. 42°-43° 30′ N.; 119° 45′-121° 15′ W. Water-Supply Paper 216. In "Geology and Water Resources of a portion of South-Central Oregon." By Gerald A. Waring.

Geological colouring. Contour interval approximately 100 ft.

OREGON.—Reconnaissance Topographic map of South-Central Oregon. Scale, 6 miles to an inch. Water-Supply Paper 220. By G. A. Waring.

CALIFORNIA.—Water Supply Paper 219. "Ground Waters and Irrigation Enterprises in the Foothill Belt, Southern California." By Walter C. Mendenhall.

The maps (plates III.—IX in pocket) show the lands irrigated in the Foothill

Belt of Southern California, the chief pipe and canal lines of the various irrigating companies, the pumping plants, the artesian wells, a few of the domestic wells, ground water levels indicated by hydographic contours and artesian areas past and present.

HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Atlantic Ocean December, 1908.

Pilot Chart of the North Pacific Ocean January, 1909.

DEPARTMENT OF AGRICULTURE MAPS.

SOIL SURVEYS.—Minidoka Area, Idaho; Marion Co., Ala.; Oconee Co., S. C.; Oktibbeha Co., Miss.

Scale, 1 mile to an inch; distribution of soils shown by tints; soil profiles on margin; descriptive letterpress.

UNITED STATES.—Map of the Newark Series of Southeastern Pennsylvania. Scale, 7 miles to an inch. *Economic Geology*, Vol. 3 No. 8, Lancaster, Pa., 1908.

A black map illustrating the geology of the region across Southeastern Pennsylvania, over 30 miles wide at the Delaware, but narrowing to less than 10 miles below Reading, in which the rocks of the Newark series are found. Based on the reports of the Second Geological Survey, with additions by Edgar T. Wherry. Accompanies a paper on the Newark copper deposits. The location of the mines is shown by figures enclosed in circles.

BRAZIL.—The annual report for 1906 of the Commissão Geographica e Geologica do Estado de S. Paulo, contains the following maps:

SÃO PAULO.—Carta de Progresso da Commissão Geographica e Geologica de S. Paulo. Scale, 1:2,000,000, or 31.56 statute miles to an inch. By João Pedro Cardoso, Director of the Survey. São Paulo, 1907.

The triangulation net covers the eastern part of the state and extends westward to about 5° 30′ W. Long. from Rio de Janeiro.

The above map is also reproduced in the report as a base upon which is superposed in green a delineation of the areas covered by the coffee plantations of São Paulo.

SÃO PAULO.—Exploração do Extremo Sertão do Estado. Scale, 1:1,000,000, or 15.8 statute miles to an inch. São Paulo, 1907.

Gives a generalization of the hydographic features of the western half of the state based upon the detailed surveys made of the larger rivers.

AFRICA.

ABYSSINIA.—Lago Tzana. Scale, 1:300,000, or 4.73 statute miles to an inch. *Boll. della Soc. Geog. Italiana*, Rome, Dec., 1908.

This map in colours is based upon the map constructed by Dr. Anton Stecker and C. E. Dupuis, modified by the survey work of the Mission of the Italian Geographical Society in northern Ethiopia. The map accompanies the report of the mission and adds essential details to the present mapping of Lake Tsana, the source of the Blue Nile.

ABYSSINIA.—Schizzo del Percorso della Missione della S. G. I. in Etiopia Settentrionale (Anno 1908). Scale, 1:1,500,000, or 23.67 statute miles to an inch. *Boll. della Soc. Geog. Italiana*, Rome, Dec., 1908.

Shows the routes followed by the mission of the Italian Geographical Society in Northern Abyssinia; also, the larger highways in use or in construction.

CONGO COLONY OF BELGIUM.—Les voies d'accès au Katanga. Scale, about 240 miles to an inch. *Le Mouve. Géog.* No. 47, Brussels, 1908.

A black map showing the completed and uncompleted sections of the railroad now building between Lobito Bay on the Atlantic and the copper and gold mining regions of Katanga, in the heart of the continent; also, the lines which will join this great mineral district with South Africa the Indian Ocean and the navigable stretches of the Congo.

DAHOMEY.—Carte du Dahomey. Scale, 1:500,000, or 7.8 statute miles to an inch. By A. Meunier, Ministère des Colonies, Paris, 1908.

These three large sheets form the best existing map of the French colony of Dahomey. The map is based upon the work of twenty-three survey parties. Large nomenclature and much geographical and cultural information.

EGYPT.—The following maps are in the volume "The Topography and Geology of the Peninsula of Sinai (South-eastern portion)," Survey Department, Egypt, Cairo, 1906.

General Topographical Map of Sinai. Scale, 1:250,000, or 3.95 statute miles to an inch. The topography is shown in considerable detail in brown hachures; elevations above sea level in meters.

Geological Map of South East Sinai. Scale, 1:250,000. Eight tints to show geological formations, of which red granite is most widely diffused. The water parting between the drainage systems is indicated.

Geological Map of Fernai, Dahab District. Scale, 1:62,500, or 0.9 statute mile to an inch. Eight tints for formations; altitudes in meters above sea level, as determined by aneroid and hypsometer.

Geological Map of the Ain el Hudera area. Scale, 1:100,000, or 1.5 statute mile to an inch. Six tints for formations; fault lines indicated.

Geological Map of Ras Mohammed. Scale, 1:100,000. Shows the Miocene and Coral Reefs.

TRANSVAAL COLONY.—Map of the Transvaal Colony. Scale, 30 miles to an inch. Transvaal Geological Survey, Pretoria, 1908.

A good map with large nomenclature, railroads, etc., and colours showing the progress of the geological survey.

TRANSVAAL COLONY.—Portions of Lydenburg and Zoutpansburg Districts, including the Haenertsburg Gold Fields. Scale, about 2⅓ miles to an inch. Transvaal Geological Survey, Pretoria, 1908.

TRANSVAAL COLONY.—Portions of Rustenburg and Witwatersrand Districts. Sheet 4 Rustenburg. Scale, 2½ miles to an inch. Transvaal Geological Survey, Pretoria, 1907. Price, 2s. 6d.

Tints for Geological formations; faults, dip, anticlines and synclines shown; horizontal section on margin.

EUROPE.

HUNGARY-SERVIA.—Entwicklungsgeschichtliche Karte des Eisernen Tores. Scale, 1:200,000, or 3.1 statute miles to an inch. Von Prof. Dr. J. Cvijic. Ergänzungsheft No. 160 to *Petermanns Mitteilungen*. Justus Perthes, Gotha, 1908.

Accompanies Dr. Cvijic's monograph on the geographical and geological aspects of the Iron Gates in the Danube. Tints show the geological formations; other symbols, the physiographic aspects along this stretch of the Danube.

HUNGARY-SERVIA.—Geologische Skizze zur Entwicklungsgeschichte des Eisernen Tores. Scale, 1:300,000, or 4.73 statute miles to an inch. Von Prof. Dr. Cvijic. Ergänzungsheft No. 160 to *Petermanns Mitteilungen*. Justus Perthes, Gotha, 1908.

Geological colouring for the formations from the Danube to 10 to 20 miles away from it on both sides of the river.

MALAY ARCHIPELAGO.

DUTCH EAST INDIES.—The Third Annual Report of the Topographic Survey in the Dutch East Indies for 1907 includes the following maps:

Triangulation in Rembang. (For the Forestry Service.) Scale, 1:400,000, or 6.3 statute miles to an inch. 6°50′–7°35′ S.; 4°20′–5°20′ E. Long. from Batavia. Shows triangulations points of first, second and third orders and distribution of forests.

Bladwijzer der Residentie Semarang. Scale, 1:400,000. Shows the area of completed topographic surveys in the Residency up to Jan. 1, 1908.

Top van den Vulkaan Tampomas. Scale, 1:20,000, or 0.3 statute mile to an inch. A contoured map of the summit of this volcano.

Top van den G. Merbaboe. (Middle Java.) Scale, 1:10,000, or 0.1 statute mile to an inch. A contoured map.

Bladwijzer van Zuid-Sumatra. Scale, 1:1,500,000, or 23.67 statute miles to an inch. Showing areas surveyed on scales of 1:25,000 and 1:100,000, and the areas in which the survey is completed.

Top van den Vulkaan Kaba. (Palembang.) Scale, 1:10,000, or 0.1 statute mile to an inch. Surveyed by J. W. Kroll in 1907. A contoured map showing three craters, in two of which are crater lakes.

Uitbreiding der Landrenteplichtige Gronden in het Noord-Ooctelijk deel der Preanger-Regentschappen. Scale, 1:200,000, or 3.1 statute miles to an inch. Shows distributions of leased lands and areas in which rents are increasing or declining.

The same volume contains the following:

Eiland Curaçao, Caribbean Sea. Scale, 1:200,000, or 3.1 statute miles to an inch. Shows the roads, plantations, triangulation points and area in which surveys are completed.

MELANESIA.

KAISER WILHELMSLAND.—Kartenskizze, mit dem Wege der Expedition von Huon-Golf zur Astrolabe-Bai. Scale, 1:400,000, or 6.3 statute miles to an inch. *Mitt. aus den Deutsch. Schutzgeb.* Vol. 21, No. 4, Berlin, 1908.

Accompanies an article on the explorations and surveys of the Dammköhler-Fröhlich Expedition in the interior of Kaiser Wilhelmsland. Hill features in brown; information as to tribes, distribution of vegetation, etc.

BISMARCK ARCHIPELAGO.—Three maps on one sheet: (1) Küstenstrecke Muliama-Kudukudu. Scale, 1:150,000, or 2.38 statute miles to an inch. (2) Küstenstrecke Muliama-Toau Inseln. Scale, 1:150,000. (3) Übersichtskarte von Süd Neu-Mecklenburg. Scale, 1:450,000, or 7.1 statute miles to an inch. *Mitt. aus den Deutsch. Schutzgeb.* Vol. 21, No. 4, Berlin, 1908.

Accompanies an article by Dr. Otto Schlaginhaufen: "Orientierungsmärsche an der Ostküste von Süd-Neu-Mecklenburg." Contains many new facts relating to hydrography and native settlements along the southern coasts of New Mecklenburg.

ACCESSIONS TO THE LIBRARY.

OCTOBER–DECEMBER, 1908.

AFRICA.

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BOOK NOTICES.

La Science Séismologique. Les tremblements de terre. By Count Montessus de Ballore. With a Preface by E. Suess. 222 figures and maps. Paris, Armand Colin, 1907. (Pr. 16 fr.)

After having traced, in his "Géographie Séismologique," the causal relations between earthquakes and geological conditions, the author has given us in this book a treatise on the nature and character of earthquakes as physical phenomena, a physical seismology, so to speak, as compared with the tectonic or genetic seismology of the earlier book. In view, however, of the important influence of seismic movements on geological conditions, and *vice versa*, the author insists that this division of labour which assigns the study of the physical aspects of the phenomenon to the physicist, and that of the geological aspects to the geologist, should never be carried so far as to involve an absolute separation between the work of these two classes of scientists. Many of the difficulties which the purely physical explanation of earthquake problems have encountered may be safely laid at the door of this fatal separation. The purely physico-mathematical treatment deals with the seismic movement as if it were an ideal energy propagated according to strictly mathematical laws in a mathematically ideal medium, which results in a mere semblance of exactness that corresponds neither to actual conditions nor even to the present status of science.

Every natural science, during the successive phases which constitute its evolution, has been dominated by certain paramount theories which, in the course of time, have been replaced by others more in accordance with newer observations. In seismology the epicentrum must, according to the author, now be classed with such. The greater perfection with which instrumental work in seismology has been carried on in recent years has revealed too many discrepancies between this theory and actual observations which, if not perfectly adjusted, are at least accounted for as soon as the theory of an epicentrum is given up. Instead of looking for a local centre of the disturbance, a definition more in accordance with modern observations would characterize the seismic movement rather as a *"mouvement d'ensemble,"* e. g., a derangement or displacement of a whole portion of the earth's crust, of tectonic character, and originating at far lesser depths than those required by mathematical speculation based on the supposed existence of an epicentrum. While with regard to quakes of volcanic origin and those due to caving in ("tremblements d'écroulement," "Einsturzbeben"), the explanation

by means of an epicentrum, in the original meaning of the word, may be retained. In all other cases the term can now be used only in a conventional way to designate the region of the origin of the disturbance.

In his own treatment of the questions involved the author strictly adheres to the method of his earlier work, namely, of placing observations foremost and deducting his conclusions from them: "Les théories passent, les observations restent." In this way he takes up, after an historical introduction, first, the study of macroseisms or "direct seismological observations." He discusses the accepted facts and theories of intensity, direction, epicentrum and focus, tremors, seismic noises, marine quakes, and relations of earthquakes to other natural phenomena. The second part, on microseisms or "instrumental seismology," compares the merits of the various seismographs, of seismogrammic records, the relations of the seismic movement to the interior of the globe, and the character of the microseismic movement. The megaseisms, or "applied seismology," constitute the third part, and here the author discusses the geological effects of earthquakes, the action of earthquakes on the different building materials, and earthquake-proof architecture. By a comparative study of the works of the leading specialists on each of these numerous subjects, in the light of his own comprehensive material and experience, the author has given a perfect presentation of the present status of this science, emphasizing over and over again the need for more and trustworthy observations as a foundation for further wholesome progress, and asking for a critical revision of a number of theories sanctioned by scientific tradition, for which unquestionable proof has not yet been furnished and which, upon re-examination, might be found to be as fallacious as was the theory of the epicentrum.

In this way the book combines the three distinctive merits of a catalogue of the most important earthquakes, a reference work on seismic literature in all its branches, and a perfect cyclopedia of seismology as a science. Whoever is going to take up work along any of its lines will find in it, not only all that has been done before, but also an abundance of suggestions as to the direction in which his efforts may prove most successful. Certainly, after the publication of this volume, France can no longer be accused of not having contributed her share toward the promotion of seismic studies. M. K. G.

The Geology of the Cromwell Subdivision, Western Otago Division. Bulletin No. 5 (New Series). By James Park, New Zealand Geological Survey, Department of Mines, Wellington, New Zealand, 1908. Pp. viii+92. 20 plates, 10 maps, 6 geological sections, and an index.

The continuance of the excellent work of the New Zealand Geological Survey is expressed in the prompt appearance of new reports dealing with additional areas of that remarkable country. Geologists and geographers have come to expect these reports with an unusual degree of interest, stimulated, no doubt, by the extraordinary variety of land forms and geological structures and conditions which the islands exhibit. New Zealand is indeed a fairly complete epitome of the world's geological and physiographical features and affords a range of phenomena but rarely exceeded by any land area of equal size.

The report before us deals with part of the Western Otago Division in the south central portion of the South Island. The most conspicuous physiographic

feature of Central Otago is the now uplifted and partially dissected peneplain or base-level of erosion, the extent of which is indicated by the numerous parallel and transverse table-topped ranges that occupy the region. The mountain ranges, under various names, are merely undissected remnants of a once continuous peneplain and have gained their fragmental character from the profound gorges cut by the streams of the region since its uplift. About the headwaters of these streams it is still possible, by making long detours, to ride from range to range upon the yet undissected and flat summits of the "mountains." The peneplain was formed upon a Paleozoic mica-schist, of which there are two distinct series. The base-levelled surface coincides in many notable and, indeed, remarkable cases with the plane of foliation of the schist, but the correspondence is not universal. In three of the ranges no relation whatever exists between the plane of erosion and the planes of schistosity. The once truly base-levelled character of the country is in no way more clearly indicated than in this occasional lack of correspondence between surface and structure, where the plane of the surface is a continuation of one in which sympathy between surface and structure might lead to other conclusions.

East of the Central Otago peneplain is the great Barewood "plateau of erosion," by which is meant a now uplifted peneplain dissected by streams occupying numerous narrow gorges and ravines. Over the greater part of this plateau the mica-schist lies almost perfectly horizontal. What relation exists between these two ultimate surfaces of erosion, the Central Otago peneplain and the Barewood plateau, has not been determined, but the author is inclined to view them as faulted portions of the same original plain, the uplift by which their plateau and mountain character were gained in the present cycle differing in degree but not in kind. The profound valleys of the Central Otago peneplain are narrow and excavated by the continued action of ancient glaciers and present-day rivers. Besides these valleys, there are various basins which are *graben* or faulted depressions. The latter occupy about 45 per cent. of the original area of the peneplain. In them were laid fresh-water deposits having a thickness in places of over 1,000 feet. The period of deposition covered, probably, the whole of the Pliocene. Certain thin beds of marine shells in one of the basins indicate that the sea had access to the basin about the close of the Miocene or the beginning of the Pliocene. The flat undissected and unfaulted portions of the peneplain are covered with a thin veneer of quartz gravel, rounded or subangular, and often scattered through the loamy, peaty soil that covers the greater part of the surface.

The presence of "rock-pillars and knobs" is noted, residuals surviving the general base-leveling effects of the previous cycle of erosion. They are not, however, marked by superior hardness, and their relative immunity from degradation is referred to some accident of situation or direction of jointage. They are found where the schists lie more or less horizontally.

One of the most interesting phases of the report is the detailed study of the relation of the mountain ranges and the lake basins. It is concluded that the lake basins are *graben*, or strips of subsidence, and the flat-topped ranges are posts or blocks left standing at the level attained by the peneplain in the initial stages of the present cycle. Special study is given to the Cromwell basin. It is shown that the draining stream emerges from the basin 3 miles from the southern end. It is argued that if the basin were due to normal stream erosion the basin or valley trend and the trend of the stream would be coincident. If the basin were due to

an upwave across the path of the stream the base of the sediments should be coarse and gravelly in contrast to their actual fine character as observed in good exposures that reveal the basal members of the series. Ice erosion cannot be invoked as an agent of stream disorganisation, for the beds are Miocene and Pliocene, and the New Zealand fauna and flora for these periods require a warm or at least a temperate climate.

It may be pointed out, however, that no adequate consideration is given to the possibility that the fine sediments at the base of the series, assumed to be lacustrine, are the deeply weathered and fine material of the surface of the peneplain swept into the down-warped or down-faulted areas by the streams as the first consequence of uplift and the redistribution of land waste. In the United States some of the fine Cretaceous and Tertiary material is now quite generally considered as the last product of streams draining the Jurassic and Cretaceous peneplain before the uplift or the first product of stream erosion after uplift. The overflow of this mountain-girt basin is cut in solid rock and we fancy this fact is given more weight than it deserves. It is quite possible (and this argument seems to have been omitted from the report) that the filling of such a basin, continuing *pari passu* with the faulting, might from the first maintain a river plain, and that the even bedding is but an expression of the delicate balance maintained between a grading stream and down faulting basin floor. Such a delicate balance may well be temporarily destroyed by excessive down faulting and a lake basin formed, but there is no compulsion in the acceptance of this view so far as we can understand the evidence presented. As a further objection it may be stated that no explanation is given of the present course of the outlet. If a lake basin once existed, its outlet must have been functioned in late—lake time: (a) by faulting, or (b) by capture from an extra border region, or (c) by overflow in a location determined by some sag of the basin margin. None of these possibilities is considered. It is merely stated that the lake basin "existed long before the river found its way into it." The reviewer believes that data for the answer to these objections are in the hands of the author, and would with others cordially welcome further elucidation as a matter of wide current interest and lasting importance.

Of exceptional interest to geographers in each of the New Zealand reports in the New Series are the geographic descriptions pertaining to conditions of human habitability and to the distribution of the native fauna and flora in response to physical conditions. In the present report it is indicated that the main plateau area, called the Cromwell Flat, a tract 4,000 to 5,000 acres in extent, possesses a light but rich soil that cannot be brought under cultivation without artificial irrigation. Toward the northwest along the foothills that limit the Flat in this direction and mark the change to the upper base-leveled surface, there is a string of prosperous irrigation farms. The soil is here no richer than on the flat land below, but its situation at the foot of the range makes irrigation possible from the mountain streams. The majority of the valleys are little better than steep gorges or rocky defiles sharply incised below the level of the uplifted peneplain. The valley floors stand about 1,000 feet above the sea; the uplands range in height from 4,000 to 7,600 feet. The valley flats, terraces and foothills are bare and thirsty, except where irrigated; the uplands, better provided with moisture, are well covered with native grasses and subalpine vegetation and provide excellent pasturage for sheep even in midsummer. This contrast between valley bottom

and upland is so marked that no adequate idea of the pastoral value of the country can be obtained along the road routes, as these in most cases follow the valley floors. The key to the distribution of moisture is found in the topography and the fact that the area lies in the belt of westerly winds. The higher ranges and uplands to the west intercept the moisture, and are themselves snow-covered, while the eastern plains and plateaux in the lee of the mountains experience excessively dry Foehn winds that dry up the struggling vegetation and parch the land. "The country in its natural state is quite destitute of trees and all forest vegetation." The steep slopes leading from valley bottom to plateau top are rugged and broken and supply innumerable places of shelter and refuge for the prolific rabbit, the scourge of the sheep farmer throughout Central Otago.

It seems ungrateful, in view of the many excellent features of this report, to object to matters of detail, but when these details affect an important principle the criticism appears to be justifiable. We cannot approve the first sentence in the chapter on physiography: "An elevated peneplain may be (a) an uplifted coastal plain; (b) an uplifted base-level formed in accordance with Powell's cycle of fluviatile erosion; or (c) a desert upland in an arid climate truncated by long-continued subaerial erosion in terms of Passarge's postulate." If this statement is based upon the conception that a peneplain means "almost a plain" as the etymology of the word indicates, and is used without regard to its mode of origin, we can understand the statement referred to, though many "almost plains" are not included in such a meagre classification. But this interpretation of the word is not correct. A condition more or less closely approaching the base-leveled one is the connotation of the word "peneplain"; as for a truncated desert upland, the word levelled as vs. base-levelled has been suggested (Davis: "The Geographical Cycle in an Arid Climate": *Jour. of Geology*, Vol. XIII, No. 5, July-August, 1905); and "an uplifted coastal plain" can in no sense of the word be called a peneplain unless it has been peneplained after uplift and again elevated. If it is argued that such a base-levelled coastal plain is described in the last paragraph of the section in which the statement is made, we are still at a loss to know why *all* land forms of youth or maturity that are subject to peneplaination were not included in the classification of what "an elevated peneplain *may* be." I. B.

A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet. By Col. S. G. Burrard, R.E., F.R.S., and H. H. Hayden, B. A., F.R.G. Four Parts. Geological Survey of India, Calcutta, 1907. (Price, 2 rupees each.)

The Geological Survey of India has published four papers under the above title. Col. Burrard, one of the authors, is Superintendent of the Trigonometrical Survey, and the other, H. H. Hayden, is Superintendent of the Geological Survey of India. Part I is devoted to "The High Peaks of Asia"; part II to "The Principal Mountain Ranges of Asia"; part III to "The Rivers of the Himalaya and Tibet"; part IV, "The Geology of the Himalaya," has not yet reached this Society. The parts, issued in quarto form, are illustrated with many charts and diagrams and a few other illustrations, and a great deal of information is compressed into tables.

These publications are very timely. Geographical and geological information has been accumulating for a century, and students are now in danger of losing their way in a mass of unclassified detail. These papers have, therefore, been prepared to co-ordinate the varied observations, to show how far geological and geographical

knowledge has progressed and to indicate directions that appear favourable for future lines of advance. The three parts, now before us, are mainly geographical and the fourth is wholly geological. The parts are subdivided into sections and with each section in the table of contents is given the name of the author responsible for it. Attention is particularly called in this notice to Part I, "The High Peaks of Asia."

All the peaks of Asia exceeding 24,000 feet in height are catalogued, in order of magnitude, in five tables. There are seventy-five of these peaks of which the five highest are Mount Everest, 29,002 feet; K2, 28,250 feet; Kinchinjunga I., 28,146; Kinchinjunga II., 27,803 feet; and Makalu, 28,790.

Eleven peaks are between 26,000 and 27,000 feet in height; thirty-two between 25,000 and 26,000 feet; and twenty-seven between 24,000 and 25,000 feet.

The discussion given to Mount Everest is longest and most interesting, because new computations of its height prove conclusively that its elevation is somewhat greater than the value accepted for the last half century. There is little probability now of a higher peak than Mount Everest being discovered, and even the prospect of finding new peaks of 27,000 or 26,000 feet is becoming remote. The view long held that peaks higher than Mount Everest were standing behind it to the north is no longer tenable, for when Major Ryder traversed Tibet along the Brahmaputra in 1904 he passed 80 miles north of Mount Everest and found no peak approaching it in height.

The height of 29,002 feet assigned to Mount Everest in 1852 was the mean of the different values for the height obtained by trigonometrical surveys in 1849 and 1850 at six stations, all south of the mountain. Between 1881 and 1902 six other determinations of its height, made at five stations, all except one nearer to the mountain than any of the earlier stations, give a mean value of 29,141 feet after correction for refraction.

"The height 29,141 is still probably too small, as it has yet to be corrected for the effects of deviations of gravity. Though it is a more reliable result than 29,002, the latter value is still to be retained in maps and publications of the Survey. We cannot claim to have solved the problems of refraction, nor to have eliminated all uncertainties. Our knowledge of the deflections of gravity is still but superficial, and although we may endeavour continually to improve our heights, it would be a mistaken policy to introduce new values at every step of the investigation. Values of heights . . . furnish means of identification and are not to be altered frequently or without good reason. . . . We have discussed the height of Mount Everest to show the degree of uncertainty attaching to it, but we do not propose to substitute 29,141 for the long adopted and well known value 29,002."

K^2 has been supposed to be the second highest mountain on the earth, but its height does not differ much from that of Kinchinjunga, and it cannot yet be stated with certainty which is the higher of the two.

Of the 75 great peaks included in tables 1 to 5 only 19 have native names. If the lower peaks are taken into account, there are many thousands of prominent but unnamed summits in Asia and the problem of nomenclature has to be considered.

"It would be a mistake to attempt to attach an actual name to every peak. Astronomers do not name the stars; in olden times they grouped them in constellations, and they now number them according to right ascension. Colonel Montgomerie endeavoured to introduce for peaks a method resembling that of constellations, and he named the whole Karakoram region K and its peaks K1, K2, K3, etc. This system would have answered well, but Colonel Tanner and subsequent surveyors have departed from it, and have adopted the plan of designating each peak by the initial letter of the observer. Tanner called, for instance, the peaks he had himself observed, T45, T57, etc. The employment of observers' initials has led to confusion; two and more observers have had the same initial, and the same symbol has thus become attached to different peaks."

The authors believe there is no better plan for Tibet and Turkestan than to use in those regions the simple system introduced by Montgomerie for the Karakoram.

The paper discusses the errors of the adopted values of height. The values given

in the tables published in the paper, the authors say, must be accepted with caution. Some are more reliable than others, but none is correct to a foot, and many investigations will have to be completed before altitudes can be determined with a greater degree of accuracy than at present.

"All observations are liable to error; no telescope is perfect, no level is entirely trustworthy, no instrumental graduations are exact, and no observer is infallible. . . . Errors of measurement, however, can be greatly reduced and rendered practically negligible, if a peak be observed with a good theodolite on several occasions and from different stations."

Table XIV shows that 887 peaks have been discovered in the Himalaya and in Tibet exceeding 20,000 feet in height. Analyses of the great peaks of the Himalaya and Karakoram are given in a series of tables and charts show the geographical position of peaks of various magnitudes and the outlines of some of the great mountains and ranges.

The Topography and Geology of the Peninsula of Sinai (Southeastern portion). By W. F. Hume, Superintendent Egyptian Geological Survey. 280 pp. Maps, Photographs and Index. Survey Department, Cairo, 1906.

This large octavo is a valuable contribution to geography. Scarcely any traveller has examined the southeastern part of the Sinai peninsula and still fewer have mapped any portion of it. The Admiralty sheets, of course, correctly outline the coasts, but our general knowledge of the region has been superficial. It is almost entirely a desert of rock, gravel and boulder, and many arid valleys, plateaus and ridges, the whole forming a scene of desolation. Yet here and there, where, after sudden thunder storms, the waters rush down the main valleys, are found some fertile spots, oases of palms, seyal trees and rushes making pictures full of life and beauty. The inhabitants of these fertile spots have a good reputation for honesty and independence of character. They are active climbers, keen sportsmen, and the necessity of finding water and camel food brings the natives into close acquaintance with every recess of their hills.

Over half the work is given to a detailed description of the geography and topography of Eastern Sinai and to extended notes on the botanical, zoological and economic features of the region. Six chapters describe the geology, and the appendices certain detailed reports on the meteorological observations and the structure of the igneous region, with lists of plants and previous literature. The work will be welcomed as authoritative on all phases of the Southeastern part of the peninsula. The maps are noted in *New Maps* in this number.

Gesammelte Abhandlungen aus den Gebieten der Meteorologie und des Erdmagnetismus. Von Wilhelm von Bezold. viii and 448 pp., 66 Diagrams and 3 Maps. Friedrich Vieweg & Son, Brunswick, 1906.

Scientific specialists always welcome the collections of the lectures and papers of authoritative fellow-workers, because it is not so convenient to refer to them when they are scattered through various publications. It is gratifying that the literary output of so eminent a meteorologist as the late Prof. Dr. Bezold was put together by the lamented author the year before his death and published in this handsome volume. The collection opens with Bezold's "Beobachtungen über die Dämmerung," published in 1864, which spread the author's fame as a meteorologist far beyond his own country. Then follow three lectures upon storms, in which the author discusses the frequency and intensity of storms in their relation

to sun spots. Of the 20 papers in the volume, 16 relate to meteorological topics and the 4 remaining papers deal with Terrestrial Magnetism, in which the author penetrates far into the exploration of this branch of science and discusses the theories and results which the study has made prominent. The volume has already been widely welcomed by specialists in these departments of research.

La Grande Ile de Madagascar. Par Marius-Ary Leblond. 320 pp., numerous Illustrations, Appendices and Bibliography. Librairie Ch. Delagrave, Paris, 1907.

The author brought to the composition of this book qualifications that are not often combined in a single writer. His special studies of Madagascar and his travels in that island have made for him the reputation in France of being one of the authoritative writers on the colony. His attainments also in geology and ethnography are of no mean order; and as might be expected of the editor of the *Revue des Deux-Mondes*, he has given to his book a literary flavour that is not very common in geographical writings. Another somewhat unusual characteristic of the book is the fact that though it is based upon the author's own observations, there is no intimation, except in the preface, that he ever saw Madagascar. The work is entirely objective. Mr. Leblond's literary skill and vivid imagination make the book delightful reading; but it is much more than that, for he saw things not merely in their superficial aspects, and he has produced a very informing work, saved from all dullness by the skill of an accomplished man of letters.

He describes the various natural regions of the island, the races, their manners, work, amusements, culture, arts, beliefs and superstitions, and, in conclusion, sketches the natural resources of Madagascar and shows how fully they meet the actual requirements of the people. The many photographs are chiefly of natives, a good black map shows the relief of the land and the notes are reserved for the appendices. The bibliography contains many titles, chiefly recent.

Untersuchungen zur Geographie der Odyssee. Von Dr. Gustav Lang. 122 pp., 5 Illustrations, 4 Maps, and Index. Verlag der Hofbuchhandlung. Friedrich Gutsch, Karlsruhe, 1905. (Price, M. 3.)

One of the recent contributions to the probably insoluble question whether Leucas island, in the Ionian Archipelago, is identical with the Homeric island of Ithaca, as has been maintained by Dörpfeld and other archæologists. Dr. Lang dissents from the conclusions reached by Dörpfeld, which were based largely upon his own examination of the geographical features of Leucas.

Neuf Ans à Madagascar. Par Général Gallieni. xiv and 372 pp., 72 Illustrations, Map in Colours, and Appendix. Hachette et Cie., Paris, 1908. (Price, 25 frs.)

One of the greatest recent events in French colonial history was the pacification and organization of Madagascar by Gen. Gallieni, who was Governor-General of the island and its dependencies from September, 1896, to November, 1905. This book contains the General's own summary of that monumental work. Gallieni entered Madagascar when its condition was chaotic and the first thing to do was to restore peace and order. Both the military and the civil power were in his hands, and as fast as peace was restored in one district the work of political and

economic organization was extended over that region. Thus, step by step the great island was brought under the new *régime*. The military administration was everywhere succeeded by civil rule as fast as possible.

The whole history is full of interest, and it is told by the man who, more than any other person, shaped these events. The larger part of the book is given to the humanitarian and civilizing influences that followed the suppression of revolt. The building of roads, the establishment of schools and hospitals, the systematic warfare on diseases that were decimating the people, the development of agriculture on modern lines, the mapping of the island, the suppression of barbarous penalties imposed upon the least offenders by Malagasy justice, and the preparation of the way for colonization are a few of the topics treated by Gen. Gallieni. Many illustrations and a number of good maps are valuable features.

Geography of the Hawaiian Islands. By Charles W. Baldwin. 128 pp., 7 Maps, Many Half-tones and Appendices. American Book Co., New York, 1908. (Price, 60c.)

The first book of its kind to be published. While prepared especially for school use in the Territory of Hawaii, the book is to be recommended to all visitors to the group and to everyone who would like to read a simple and well-arranged account of these islands, founded on geographical principles. The maps, in black and white, are the first to be based upon the topographic surveys and are better than any to be found in our atlases.

A Woman's Way Through Unknown Labrador. An Account of the Exploration of the Nascaupee and George Rivers. By Mrs. Leonidas Hubbard, Jr. 305 pp. and 52 Illustrations and Map. No index. The McClure Company, New York, 1908. (Price, $1.50.)

There are very few books like this, because there are very few women who engage in pioneer exploration. Mr. Leonidas Hubbard, Jr., with two comrades, went to Labrador in 1903, for the purpose of exploring and mapping two large rivers in the peninsula, of which very little was known. He died in the far interior and the object of his expedition was not achieved. His wife determined to carry out his unfinished work. She did so completely, and this volume is the story not only of her own journey but also of her husband's travels, reproducing most of his diary.

Mrs. Hubbard revealed to the world the whole course of the wild Nascaupee River and mapped from source to mouth the George River, only half of which had previously been known. She had many adventures in the long journey down one river and up another, met the migrating caribou, and spent a little time among the Montagnais Indians and the Barren Ground people, of whom she gives interesting particulars. Her work was not scientific, but it was an excellent piece of pioneer research which has been recognized as worthy by the geographical authorities of America and Europe. The book is well written, illustrated from Mrs. Hubbard's photographs and its large map, faithfully recording the details of her long route survey, was produced for the explorer by the American Geographical Society and first appeared in the *Bulletin* (Vol. 38, 1906, p. 528). The additions Mrs. Hubbard made to the cartography of Labrador have been utilized on the later maps of the Geological Survey of Canada and reproduced in *L'Année Cartographique* and the *Geographen Kalender*.

Bishop Hannington and the Story of the Uganda Mission. By W. Grinton Berry. vi and 208 pp., with Portrait and Sketches. Fleming H. Revell Co., New York, 1908. (Price, $1.00.)

Bishop Hannington, of the Church Missionary Society of England, was murdered by order of Mwanga, King of Uganda, in 1885, three years after he had entered the African field. This king, son of Mtesa, whom Speke and Stanley made famous in their books, was a youth of vicious propensities who had been alarmed by the influence which missionaries were acquiring over his subjects. At the ill-fated moment when he was planning the massacre of all missionaries, he heard of the approach of Bishop Hannington, and by his command the Bishop was killed on the eastern frontier of Uganda.

About a third of the book is from the writings of Bishop Hannington, illustrated by sketches, always humourous, drawn by that African pioneer. The story the book tells relates to one of the most thrilling episodes in the opening of Africa, when many hundreds of Mwanga's subjects suffered martyrdom rather than renounce their new religious faith. Subsequent events in Uganda, marked by the great success of Protestant and Roman Catholic missionary effort, are told in the concluding chapters. Sixty thousand persons are now members of the Protestant Episcopal Church and the Catholic faith also has a vast number of adherents. Recently, however, the population of over 1,000,000 has suffered terribly from the ravages of sleeping sickness, and, since the opening of the railroad and the influx of population from Mombasa and Zanzibar, the physical results of vice have intensified the evils that imperil this fine race.

Bishop Hannington was a great pioneer teacher and the book is a worthy record of the work he did and of the bloody era of which he was one of the first victims.

Trois Années de Chasse Au Mozambique. Par Guillaume Vasse. 190 pp., 55 Illustrations and 1 Map. Hachette & Co., Paris, 1909. (Price, 4 fr.)

More serious motives than sport in the wilds of Africa took the author to the virgin field of Mozambique. He went there as the agent of various societies of natural history to make studies and collections for them. He spent three years in a part of this Portuguese territory which was almost entirely unknown, and his results, therefore, have much geographical value. A hunter of experience, Mr. Vasse obtained very fine specimens of most of the mammalia and birds of the region. His narrative, which was earlier published in *Tour du Monde,* describes his work in all its variety and is illustrated by many fine photographs, chiefly of the big game of Mozambique.

Das Trappisten-Missionskloster Mariannhill, oder Bilder aus dem afrikanischen Missionsleben. Im Auftrage seiner Obern gesammelt von einem Ordenspriester. (small quarto.) 186 pp., Map and Many Photographic Reproductions. B. Herder, St. Louis, Mo., 1907. (Price, $1.25 net.)

Mariannhill, a few miles from the port of Durban, Natal, is famous for its flourishing mission station under the care of the Trappists. Hundreds of boys, girls and young people of the Kaffir tribes are gathered here every year under the influence of European missionaries and sisters, who ground them in reading,

writing and arithmetic and teach them all kinds of trades, from gardening and the arts of housewifery to the building trades, printing and cabinet-making.

Out of this useful institution has just come a volume, published by Herder in fine style, illustrating the life at this busy centre of civilizing influences. It celebrates the twenty-fifth anniversary of the founding of this institution. Missionaries in various parts of Africa have written books descriptive of their pioneer labours, but none has yet appeared which more faithfully and minutely depicts in text and picture the various phases of the great work going on to-day in so many parts of Africa, of teaching to untutored millions the dignity and usefulness of labour and of training them to toil efficiently in many branches of skilled labour. The numerous exceptionally fine photographs in the book show the native life of the blacks and their development as they learn from the devoted European friends the many ways in which they may become more useful to themselves and to the whites who now live among their people. The book is to be recommended as one of the best products illustrating the marvelous changes that are now in progress among vast numbers of the native African population.

Greece. Handbook for Travellers. By Karl Baedeker. cxxvi and 447 pp., 16 Maps, 30 Plans, 2 Diagrams and a Panorama of Athens. 4th Edition. K. Baedeker, Leipzig, 1909. (Price, M. 8.)

The handbook has been revised and enlarged so as to incorporate the important results of recent archæological research as well as the advances in the means of communication in Greece. Many sections have been rewritten.

Historical Atlas with Chronological Notes. By E. A. Benians and T. H. Knight. 89 pp. and 44 Maps. George Gill & Sons, Ltd., London, 1908 (?). (Price, 8d.)

A small atlas providing material for a general knowledge of English history and especially arranged for use in preparing examinations. The maps cover British history from B. C. 55 to the India of to-day and the recent battlefields in South Africa. They are not of the best execution, but clearly express the facts; and opposite each coloured plate is a page of chronological notes outlining the history which the map illustrates.

Washed by Four Seas. An English Officer's Travels in the Near East. By H. C. Woods. Introduction by Sir Martin Conway. xvi and 316 pp., Maps and over 60 Illustrations from the Author's Photographs. T. Fisher Unwin, London, 1908.

While the author was in the British army he travelled extensively in Balkan countries and made a journey also in Anatolia to obtain information on certain military and other questions. His book is not a continuous narrative of his wanderings, but he groups under such headings as "Defences of Constantinople," "The Rhodope Balkans," "The Turks," and "Bulgaria and the Bulgarians" the impressions he derived from his travels. The interest of his book is enhanced by the fact that his routes were largely off the beaten tracks. His impressions are simply expressed and indicate a careful observer and a desire accurately to express what he thought best worth describing. Some of his most attractive pages in the chapter on the Bulgarians and their country, for example, deal with the character and life of the peasants, their customs, vocations, schools and pastimes, espe-

cially the "hora" or native dance, which is taught to all the children as a part of their education. Another chapter is given to some of the towns of Bulgaria, as Sofia, Philippopolis and Plevna, whose siege of eleven months by the Russian army made the place famous in the Russo-Turkish war. Here are a few sentences from the author's description of the differences between the people of Anatolia and those of Turkey in Europe:

> It is impossible not to notice several points of difference between the inhabitants of Anatolia and the European subjects of the Sultan. The former people are distinctly far more hard-working; they are quieter, simpler in their tastes and more civil to strangers than are their European brethren. Every man is a king in his own eyes; my experience was that every man tried to do his best for my comfort, and when a bargain was made he attempted to carry it out.

The author adds that the people of Anatolia carry out their religious duties more rigorously than those of the Balkan peninsula, and that they are less suspicious and place fewer difficulties in the way of the traveller.

The book contains no treatment of geography in an expert sense, but it is full of excellent information.

The Book of Ceylon. By Henry W. Cave. xii and 664 pp., 756 Illustrations from Photographs and 9 Maps and Plans. Cassell & Co., New York and London, 1908. (Price, $4.75.)

Mr. Cave is already well known by his earlier books on Ceylon. He was thoroughly qualified to carry out the design of this volume, which is to help the traveller in Ceylon to a fuller enjoyment of the varied attractions of the island.

In the first chapters he describes the geography, climate and history of Ceylon, and then leads the reader through the island in various directions, paying most attention to the country along the railroads and other routes which travellers most frequent. He gives clear and concise descriptions of each scene of interest. The book is especially notable for the great number of fine half-tone illustrations which show the island in many aspects. They add largely to the value of the book, but as they are printed on thick, sized paper they make the book uncomfortably heavy. A more comprehensive index would have increased the convenience of consulting this important work.

Hindustani Self-Taught. By Captain C. A. Thimm. 3rd Edition, 112 pp. E. Marlborough & Co., London, 1908. (Price. 2s. 6d.)

This little volume is especially intended for the service of travellers, traders, missionaries and soldiers, as well as for the student. A phonetic pronunciation is given throughout, and the system of study is based upon the idea that the natural way a child learns to speak its native tongue is the best way to acquire a language. The vocabularies fill about two-thirds of the book and are supplemented by a large number of conversational phrases and sentences.

The House in the Water. A Book of Animal Stories. By Charles G. D. Roberts. viii and 301 pp. and Illustrations. L. C. Page & Co., Boston, 1908.

The book is especially adapted for young readers who are interested in woodcraft. A large part of it is given to the remarkable life of that acute and tireless toiler, the beaver; but bears, wolverines and other animals also figure in the narrative and the adventures of "The Boy" and of "Jabe the Woodman" supply the human element.

La Colombie Britannique. Étude sur la colonisation au Canada. Par Albert Métin. A. Colin, Paris, 1908.

A very conscientious, elaborate, tersely and logically written description of British Columbia, from the standpoint of geography and economic conditions and outlooks. The geology of the country is the sub-stratum on which the work is built up, then follow the flora and fauna, man forming the apex of the structure. This is already observed in the introduction. A mass of detail is crowded into this octavo volume of over 400 pages, yet it is not wearisome to read for whosoever takes a special interest in the subject. Thirty-three photogravures and twenty maps and charts accompany the text.

"It may be said of Columbia that it was made valuable ere being scientifically studied and that its geography has come after economic development." With this sentence the introduction begins and, while it is true, it also holds good for many other regions of the globe. Nevertheless, the history of discovery and exploration of the territory, as very well given in that introduction, proves that, here as elsewhere, exploration, coupled with scientific research, preceded to a limited extent, at least, the attempts at colonization and improvement. The scientific (nautical) labours of James Cook and George Vancouver opened the coast to the practical work of seal fishery, and Mackenzie disclosed the geography of the interior at a time when trappers and fur-traders were beginning to penetrate towards British Columbia. The author pays a generous tribute of respect to the geographical and other scientific researches performed by the English, on the coast as well as inland, and in this he stands in favourable contrast with the general British tendency to belittle or sneer at, causelessly, the work of other nationalities in foreign lands. A veritable tribute of admiration is paid by him to the energy and industrial activity of the inhabitants of Columbia, who, while not numbering quite 200,000 souls, including 25,000 Indians, produced in 1906 nearly $50,000,000, or $250 for every man, woman or child in the territory. It is true that about one-half of this production proceeds from mines; and this in a region not well adapted to human abode, to which, for the subsistence of the people, $7,000,000 worth of agricultural and animal products must be imported annually, because the home production remains insufficient.

The first part of the six into which the body of the book is divided, consists of five chapters devoted to a detailed description of the topography of the country (beginning with the islands that skirt the coast), its orography, all resting on the basis of a careful geological study. The latter may even seem to be too minute for the scope of the work and tiresome through superabundance of details, and yet it is by no means superfluous. We might even wish for a greater number of hypsometric data, but they were probably not at the author's command.

The second part, in three chapters, treats of the climate or rather of the three climates: that of the coast, of the arid inland sections, and of the mountains. He characterizes each type with care and precision. Equally conscientious are his observations on the glaciers, the lakes and rivers. While the study of the Columbian glaciers does not seem to be greatly advanced, it is well to note that, with the exception of one, they have been receding steadily since 1887, an observation which is also made in the South American Andes, where the retrocession is about equal to that observed in British Columbia.

Vegetation, as far as arboriferous, presents two distinct zones: the northern, which bears the arctic character, and the southern, closely allied to the flora of

the United States. The highest summits of the mountains are, of course, denuded, and much of the interior tableland is bare owing to aridity, otherwise the territory is well supplied with timber of considerable economic value. The prevailing forms and species are too well known to need recapitulation.

The third part is properly ethnographic and historic. A cursory and quite complete list of the various expeditions to the coast of Columbia forms the beginning, the Spaniards, of course, heading the record. The expedition of Juan de Fuca is, perhaps, not so doubtful as the author represents it to be, and as to the statement that the Strait of Anian appears on one map (from 1598), we might suggest the modification that it appears on several and on at least one globe from the sixteenth century.

The very interesting continuations of this historical part cannot be reviewed in detail. Their connection with geography is obvious and their value for an understanding of the development and present condition of the colony very great. The same fairness in judging of conditions far different from those met with in any French colony would be well worthy the imitation of British writers when treating of other countries and other peoples.

A long and detailed chapter on the Indians is very properly divided into two parts, one of which treats of the Indian as far as he has still preserved ancient customs and manners, while the other presents a picture of the changes that have taken place with the aborigines under the influence of growing contact with civilization. The last chapter of part 3 is devoted to "Population and Immigration." It is, of course, replete with statistics, and no pains have been spared to gather abundant and reliable information.

The three remaining parts are strictly devoted to what might be termed economic geography. Fishing, hunting and agriculture head the list, then follow the mines, and, lastly, a glance (and an important one too) at what the author calls "Economic Regions." The contents of these parts again bear testimony to the carefulness and assiduity of the writer. It is an arduous task to get together such a volume of facts and to present them finally in a manner, if not always attractive, at least very seldom tedious. A. F. B.

Pflanzengeographie. Von Professor Dr. Ludwig Diels. 164 pp. and Sketch Map. G. J. Göschen'sche Verlagshandlung, Leipzig, 1908. (Price, 80 pf.)

A condensed description of the distribution of plant life, the natural influences which promote its growth and the forms of vegetation characterizing regions of different natural conditions. The work of a botanical authority and a good example of the treatment, adequate for many purposes, of a scientific topic in short compass, for which the Sammlung Göschen is noted.

L'Afrique du Nord. Par Henri Lorin. 418 pp., 27 Engravings, 5 Maps and Index. Armand Colin, Paris, 1908. (Price, 3.50 frs.)

Prof. Lorin has brought together in this volume the information necessary to give most readers an adequate acquaintance with the general and regional geography of Tunis, Algeria and Morocco and with the problems relating to their economic and political development. His book is especially designed for teachers and advanced students, officials and colonists. It is an excellent work, prepared largely on the model of the two series of advanced text-books, "Nouveau Cours de Géographie," produced by the publishing houses of Delagrave and Hachette.

The opening sections treat of the general geography and the peoples of north Africa, with a *résumé* of its history. Studies of the regional geography occupy 170, economic geography, 100, and political geography, 55 pages. Each of the 26 sections is introduced with a bibliography and concludes with a *résumé*. The volume has a good index of geographical names.

Indien. Das alte Wunderland und seine Bewohner. Geschildert von Hans Gehring. Part I. vi and 260 pp. and 92 Illustrations from Photographs. Otto Spamer, Leipzig, 1907.

Part II. of this work has not yet reached the Society. The first volume indicates that Mr. Gehring has carried out his purpose quite successfully. His aim was to compress in about 500 large octavo pages so much of India, in all its chief phases of interest, that the work might be an adequate reading and reference book in small compass. No attempt has heretofore been made to produce such a work covering the whole of India.

The author devotes each chapter to one topic or a group of allied topics. In his chapter, for example, on the present population of India he deals concisely with the languages, the caste system and the racial divisions of the people. Twenty pages include all the author has to say on the women of India, their position, education, child marriages, widowhood, etc. In six pages he condenses his remarks on the religious and philosophical literature of India.

The success of the work, of course, depends upon the author's selection of the things that must be said and his suppression of all data that are not essential in giving a broad view of the matters treated. Mr. Gehring seems to have been equal to this severe test. The volume does not read like a handbook. Its topics, under each head, are easily and naturally connected and he makes them interesting. One may read his pages without constantly seeing the marks of rigid condensation. The reason is because the author has limited his treatment to the vital things without especially compressing his statement or description of what these things are. The illustrations are excellent and typical.

Souvenirs d'Égypte. Par Émile Daullia. 167 pp. Paris, Augustin Challamel, 1908.

A book with literary flavour and a readable supplement to the guide books which the tourist carries. The author gives impressionist views of the general aspects of Egypt and of the monuments and ruins which distinguish it. Many who make the Nile journey may profit by reading this little volume at the outset, for it will give them points of view which they might easily overlook. The work treats of the great objects of interest from Alexandria to Assuan. It is of the nature of a helpful bit of reading before or during the journey and of a pleasant souvenir of the Egyptian tour.

Botanische und Landwirtschaftliche Studien auf Java. Von Dr. W. Detmer. 124 pp. and 2 Photographs. Gustav Fischer in Jena, 1907. (Price, M. 2;50.)

Dr. Detmer has treated the botany of Java with an especial view to the economic importance of its plant life. His book is a thoroughly well arranged study of that part of the vegetation which is utilized in the industries. It deals with the general industrial conditions and describes the soils of Java, the culture of

tea, cacao, quinine, sugar-cane, and other great industrial plants and the weather conditions which promote the various plantation and forest industries.

Zur Erwerbung von Deutsch-Ostafrika. Ein Beitrag zu seiner Geschichte. Von Dr. Joachim Graf v. Pfeil. 231 pp. and Frontispiece. Karl Curtius, Berlin, 1907. (Price, M. 4.80.)

Count von Pfeil, one of the founders of German East Africa, has given here an account of his pioneer labours in that region, and especially of the ideas, policies and contingencies which shaped the efforts of the men who laid foundations for the German occupancy. The author has also much to say of the serious differences that arose between Dr. Carl Peters and himself with regard to the methods to be pursued. Peters had previously given his own version of the conflict between them. The work is valuable as an authoritative contribution to the history of the beginnings of this colony, and of the conditions that largely shaped the activities of the Germans in the first years.

In the Woods and on the Shore. By Richard D. Ware. xii and 279 pp. and 36 Illustrations from Half-tones. L. C. Page & Co., Boston, 1908.

These are descriptions of the chase and of the stream, sketches of happenings in the woods and along the shores of fishing waters. Of special interest is the detailed description of the range and habits of the Newfoundland stag and the black moose. All the pictures were taken with the cameras of the author and his friends.

Lala-Lamba Handbook. By A. C. Madan. 142 pp. Clarendon Press, Oxford, 1908. (Price, 3s. 6d.)

The Lala-Lamba dialects are nearly identical and the knowledge of either is a sufficient introduction to the other. Both are closely allied to the Wisa dialect, and this volume is a short supplementary account of the Lala dialect, showing its relations both of likeness and unlikeness to the Wisa. Of particular interest to students of Bantu.

The Lenje Handbook. By A. C. Madan. 154 pp. Clarendon Press, Oxford, 1908. (3s. 6d.)

A short introduction to the Lenje dialect, spoken in Northwest Rhodesia.

The Story of the New England Whalers. By John R. Spears. 418 pp. and 10 illustrations. The Macmillan Co., New York, 1908. (Pr. $1.50.)

The author of this book has for many years been known as one of the best informed and most reliable writers on the various phases of sea life and enterprise. He now adds another volume to the considerable number of instructive and entertaining books he has written. It is the story of the origin and development of the New England whaling industry, especially adapted for general readers, and likely to take its place among those histories of adventure which are popular among boys and young men.

The history begins with the aboriginal whale hunters, the native Americans and the Eskimos, describes the early days of the Nantucket industry and the part that other American ports took in it, tells of whales as the whalers knew them, describes whaling as a business enterprise, and recites numerous adventures of our whalemen in the pursuit of the animal.